Vol. XXIX MAY 1935 Number 5

EXCAVATING ENGINEER

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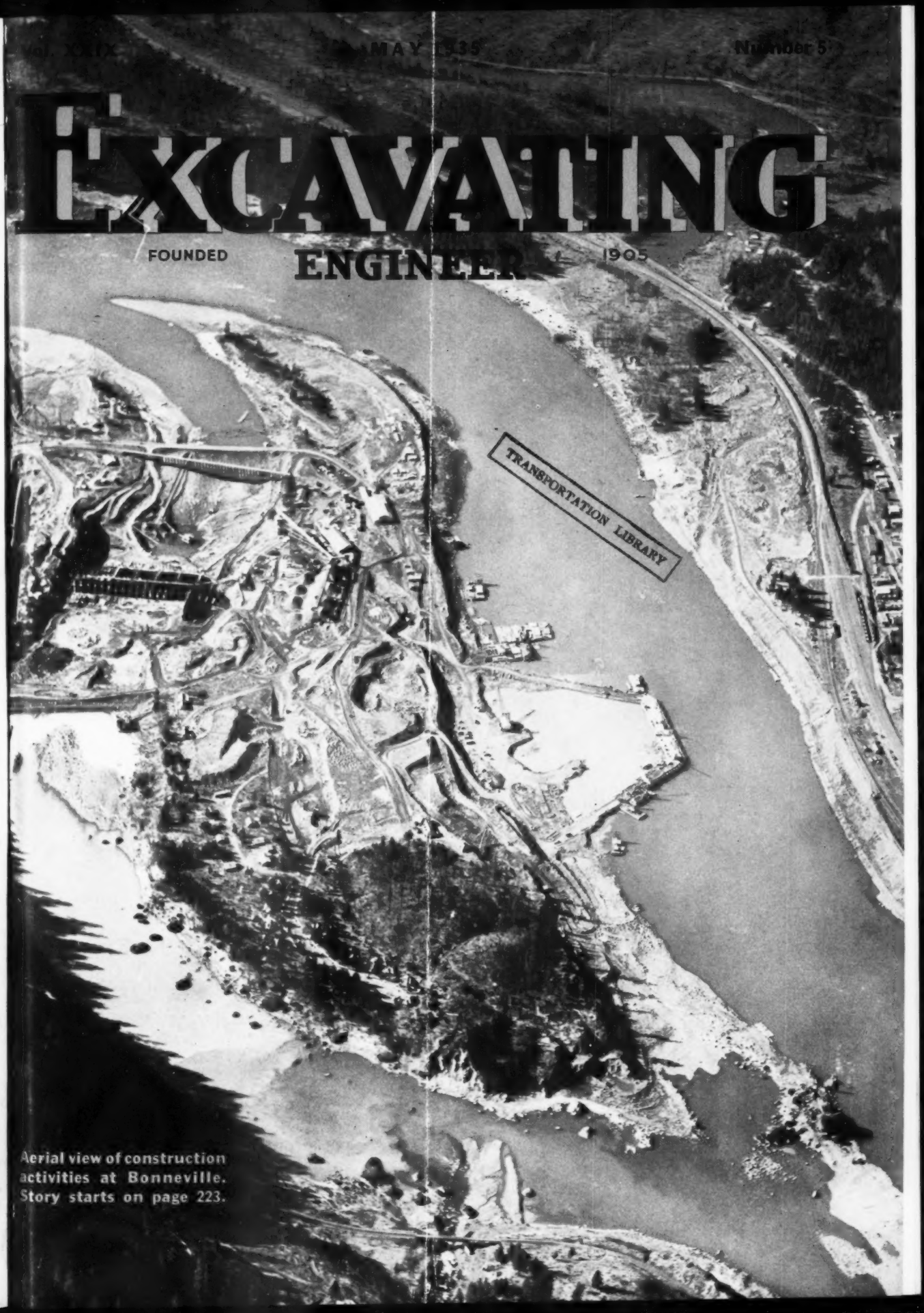

Aerial view of construction activities at Bonneville. Story starts on page 223.

On a road-building contract near Towson, Md., "Caterpillar" Diesel Tractors slash the costs of moving earth from cut to fill

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EXCAVATING, DRILLING, AND MATERIAL-HANDLING EQUIPMENT...SOUTH MILWAUKEE, WISCONSIN

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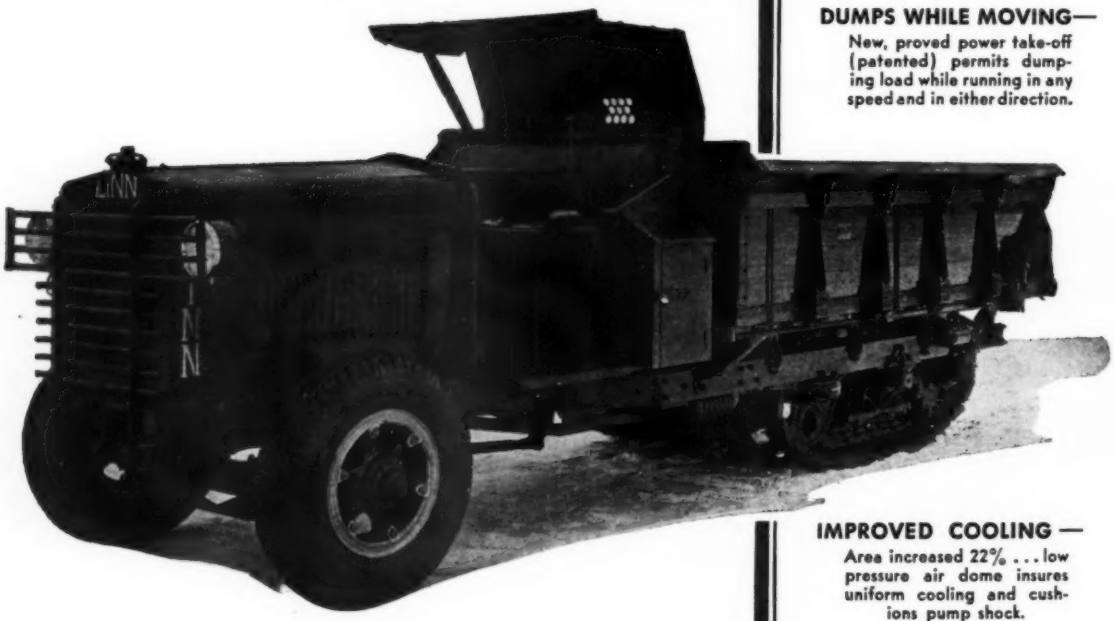

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EXCAVATING ENGINEER

DEVOTED EXCLUSIVELY TO EXCAVATION

About Excavating Projects — By Excavating Men — For Excavating Men — The World Over

Vol. 29 MAY, 1935 No. 5

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This picture, taken February 25, 1935, looking downstream, shows General-Shea Company's work on the powerhouse substructure and navigation locks, on the left, (Oregon side of Bradford Island) nearing completion. To the right of the Island, Columbia Construction Company's south coffer-dam is complete and dewatering started. The river bank on the Washington side, opposite the coffer-dam, has been widened.

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At present, there are two main contracts being worked out on this $31,000,000 power and navigation project, 40 miles up the Columbia from Portland. Columbia Construction Company are engaged on their $9,000,000 spillway dam project. And General-Shea Company are progressing rapidly on the construction of the powerhouse substructure and navigation locks; their contract amounting to approximately $5,000,000.

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Open-cut Excavation on the Aqueduct.

Aqueduct Construction Company's contract for the construction of four sections of the Colorado River Aqueduct calls for 4,000,000 yards of excavation.

Open Pit Operations at Flin Flon.

Eight Bucyrus-Armstrong blast-hole drills are used by Hudson Bay Mining and Smelting Co., Ltd., at their Flin-Flon, Manitoba, mine.

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F. O. WYSE
Managing Editor

ARNOLD ANDREWS
Editor

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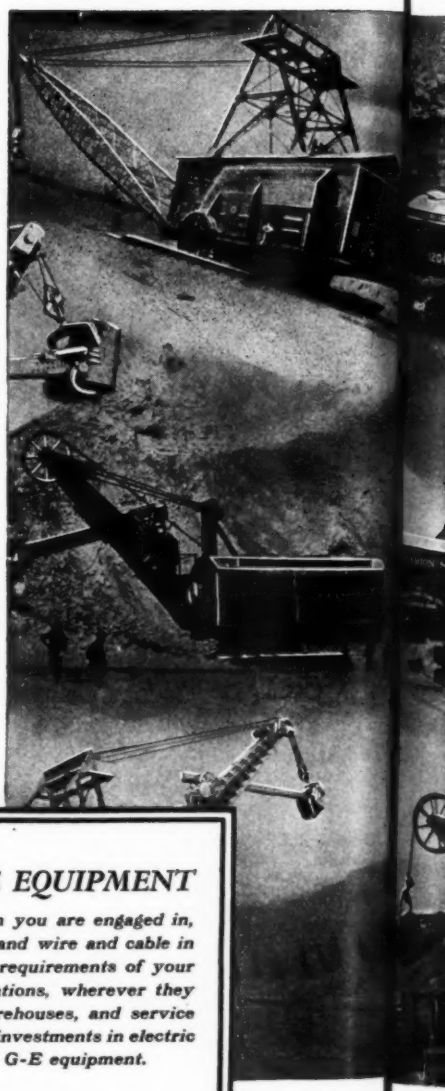

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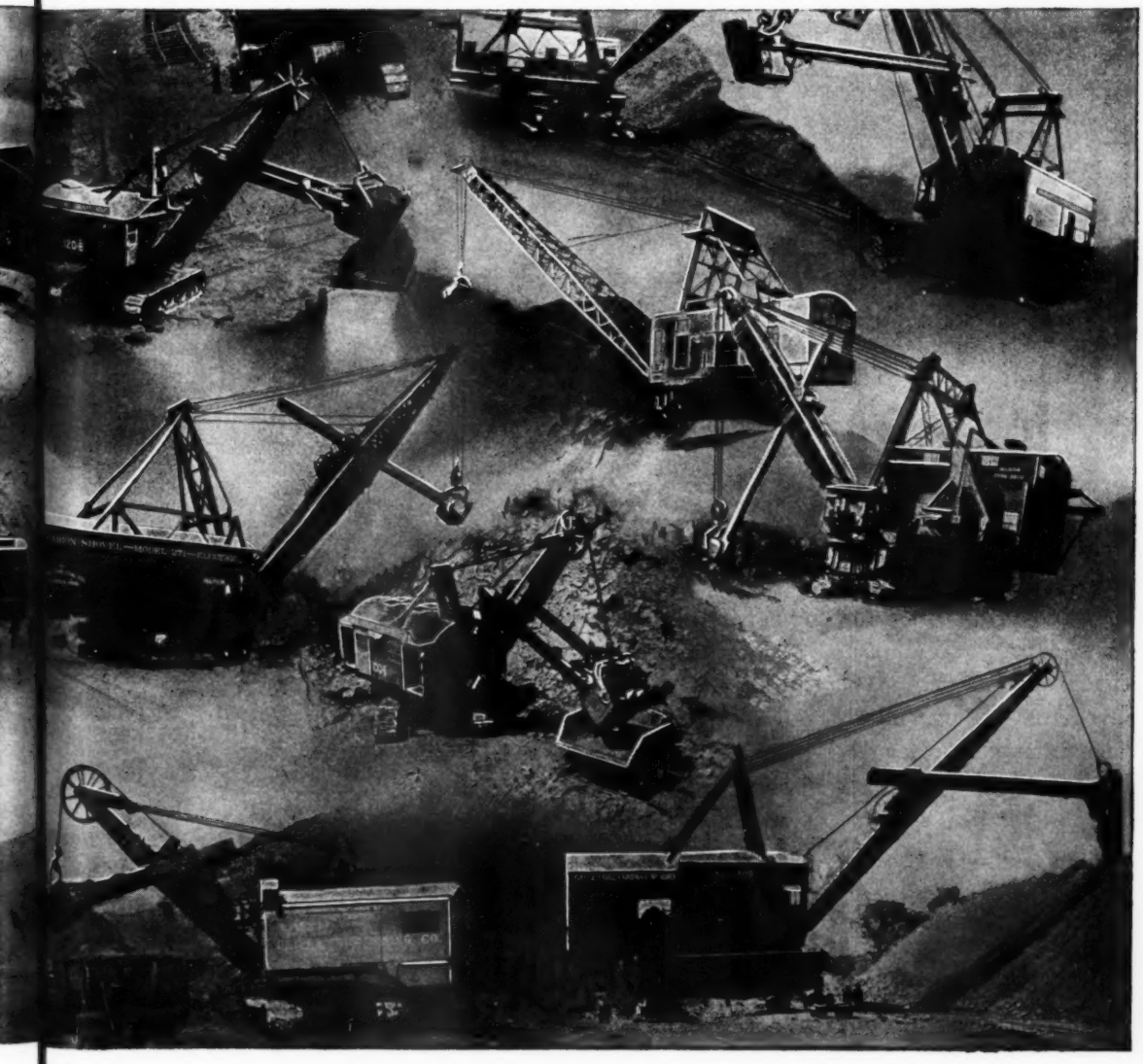

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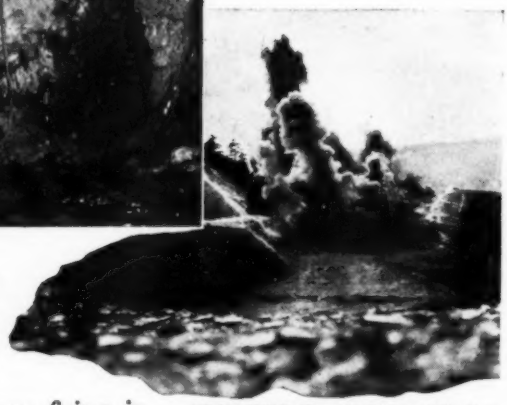
TUNNELING. Hercules Planned Blasting speeds tunnel progress by making available modern explosives and blasting supplies, and technical service.



ROCK CUTS. Hercules Planned Blasting helped to put this road job through in record time at a substantial saving in blasting costs.

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on a life-line of steel

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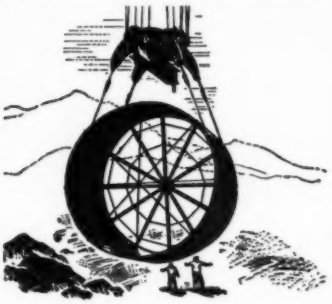

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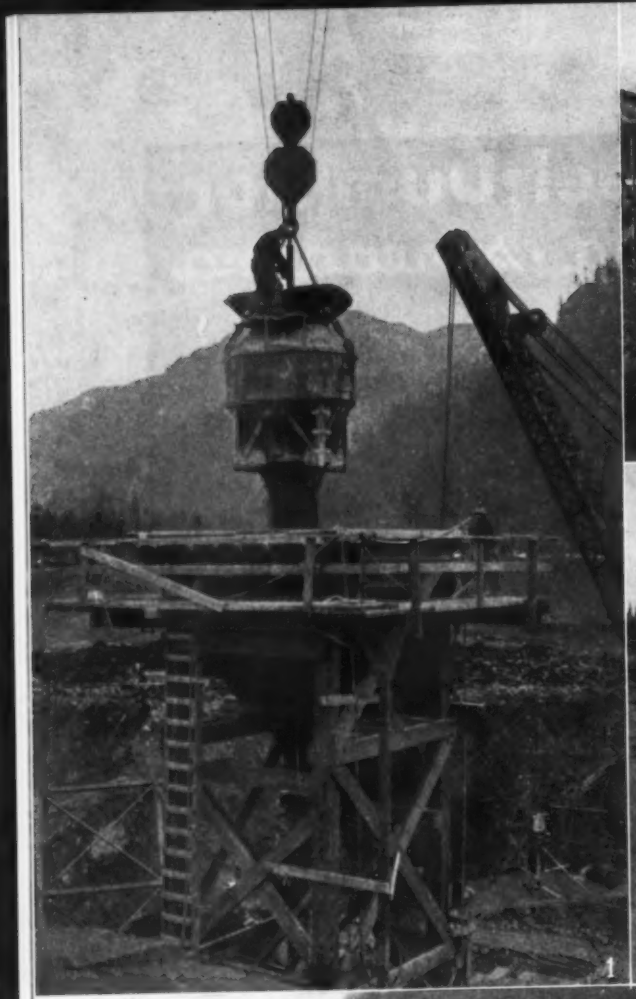

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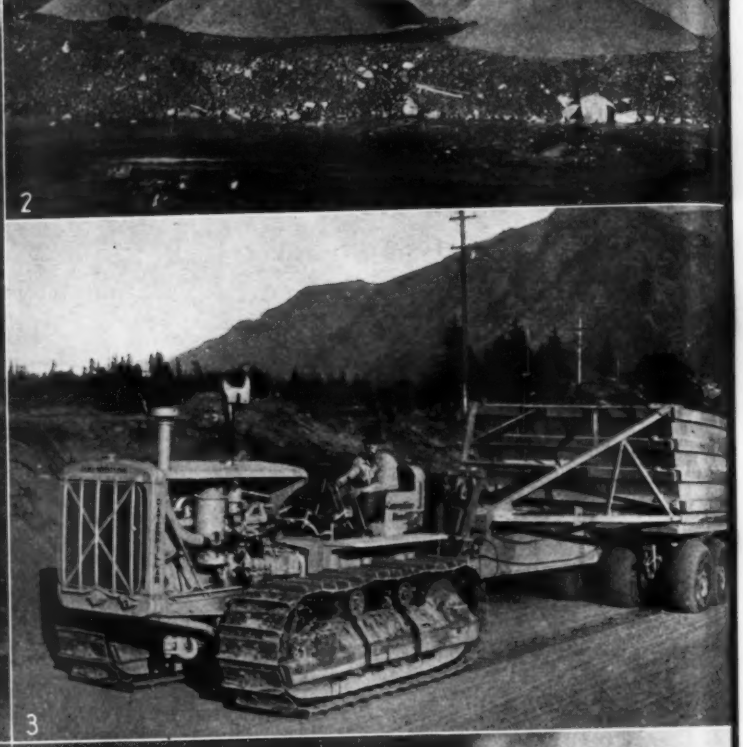

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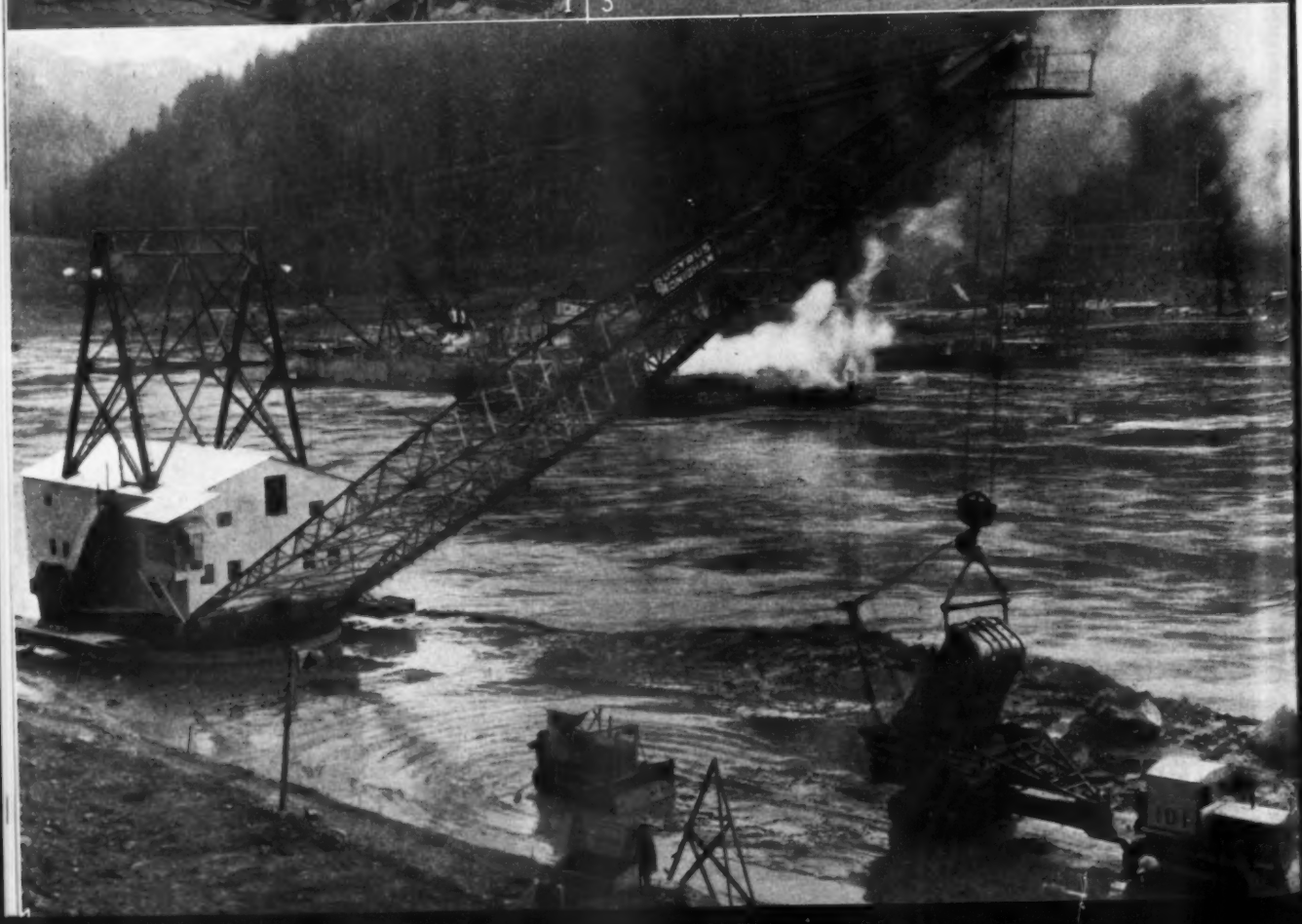

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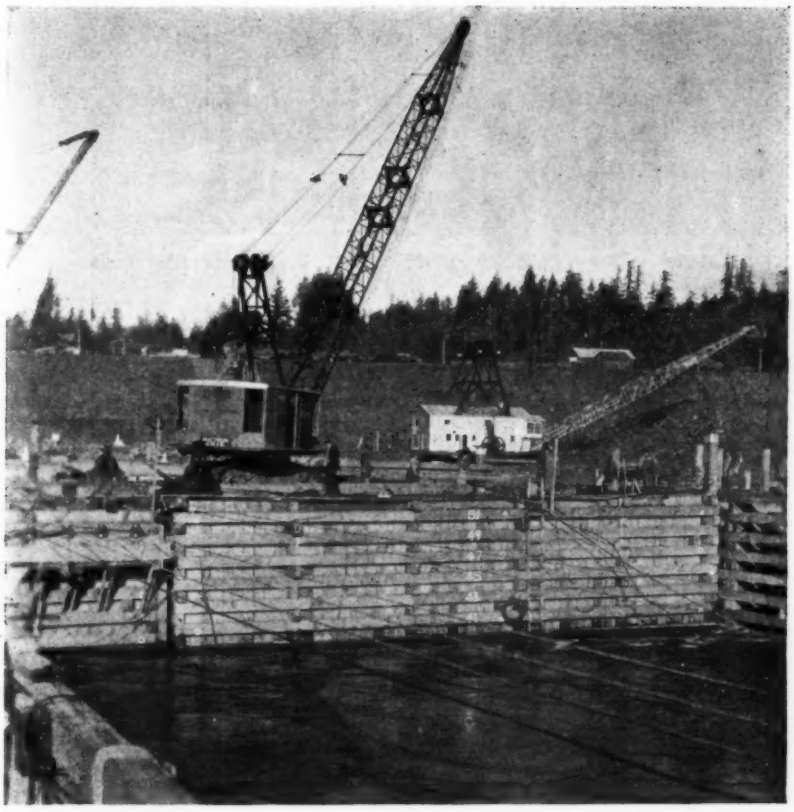
MAY 1935
VOL. XXIX NO. 5

● *Columbia Construction Company's Bucyrus-Erie 43-B Diesel crane handled the heavy timbers used in building up the coffer-dam cribs which were sunk into place with rock.*



Good Progress Made at Bonneville

By HENRY W. YOUNG

Unusual hazards encountered in construction of spillway dam, and of powerhouse substructure and locks

THERE ARE TWO main phases in the construction work on the Columbia River project at Bonneville, Oregon. One is the construction of the powerhouse and navigation locks between Bradford Island and the Oregon shore. And the other is the spillway dam between the Island and the Washington shore.

The preliminary excavation for the powerhouse and locks, by the Guy F. Atkinson Company, was described in the July 1934 issue of EXCAVATING ENGINEER. General-Shea Company have the contract for the powerhouse substructure and locks. The contract for the main spillway dam to the north of Bradford Island, amounting to $8,972,650, was awarded to the Columbia Construction Company, Bonneville, Oregon.

The latter company started work July 17, 1934. Following the incidental clearing on both sides of the river, they began the job of widening the channel on the Washington side, opposite Bradford Island. This work consisted of excavating the river bank for a distance of approximately ½ mile, forming a slope of 1½ to 1 down to elevation-10, with a 20-foot berm above high water. Sand, gravel and some boulders, totaling 720,000 yards, were removed. The widened channel greatly increases the carrying capacity of the river bed during flood stages, compensating for

Frontispiece

● *1. A 6-yard load of concrete drops from the bucket carried on the cableway to a hopper for transferring to the powerhouse substructure forms. 2. Aggregate storage yard, used by General-Shea Company, has a capacity of 16,000 yards under the conveyor. The smaller piles in the foreground are used for other purposes than the main construction and are not unloaded by conveyors. 3. On its way to the dump, this LeTourneau buggy, pulled by a Caterpillar Diesel 75, makes quick time with its 35-yard load for Columbia Construction Company. 4. The river channel has been widened on the Washington side to increase its carrying capacity during flood stages.*

● *Six Byron-Jackson pumps, each driven by 200 H. P. motors, are installed in this pump house located on the downstream wall of the coffer-dam.*

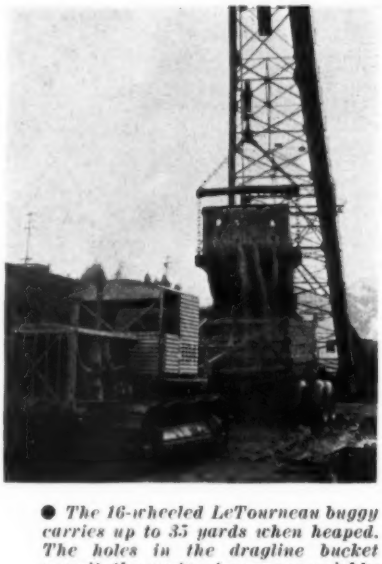
the loss of the channel south of Bradford Island.

Most of the excavation was handled by a Bucyrus-Monighan 6160, electric, walking dragline. In addition, two Bucyrus-Eries—a 75-B electric shovel, convertible to dragline, and a 43-B Diesel-powered combination shovel, dragline, and crane — and a Marion 490 electric dragline were used. These machines loaded to a fleet of Le Tourneau buggies, ranging in size from 9 to 35 yards, and drawn by Caterpillar Diesel 75s.

Coincident with the channel widening work, construction of the south coffer-dam on the Bradford Island side had been proceeding during the fall. The dam is roughly U-shaped, extending to midstream, and enclosing between six and seven acres. Approximately 300,000 yards of common, and 125,000 yards of rock are to be excavated here for the base of the south section of the spillway dam.

Huge Timber Cribs Form Coffer-Dam

The coffer-dam was made by sinking huge timber cribs, ranging in height from 61 feet for the midstream cribs down to 40 feet for the shore cribs, filled with rock to the river bottom. After a crib had been partially built up on the shore, it was floated into position. Here, construction was completed by adding to its height as it sank with its load of rock.



● *The 16-wheeled LeTourneau buggy carries up to 35 yards when heaped. The holes in the dragline bucket permit the water to escape quickly when digging from the river bottom.*

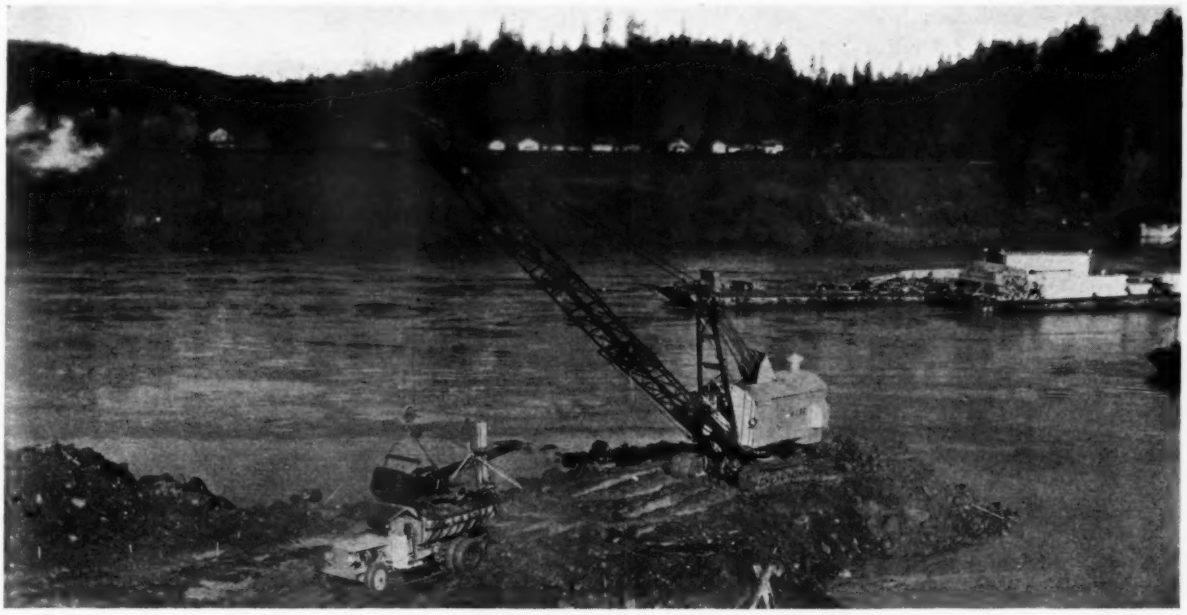
The coffer-dam, in which 4,900,000 feet of lumber was used, was sheathed on the outer face with steel sheet piling. Impervious fills, together with the sheet piling, made the coffer-dam watertight.

The coffer-dam was de-watered by a battery of six 12,000 G. P.M. Byron-Jackson deep well pumps installed in a pump house on the downstream wall of the coffer-dam. On the upstream wall, there is an additional pump of the same type and size. A 12-inch Byron-Jackson and a 14-inch Cameron pump are mounted on a barge floating inside the coffer-dam, both discharging to a common header.

As this is written the coffer-dam has been de-watered for the purpose of making leakage tests. Impervious material is being added, as required, to reduce the leakage to a minimum before the coming of the June floods. By March 1, the leakage had been reduced to about 75 second-feet. When the floods come, the coffer-dam will be inundated, to be again de-watered when the river subsides in July.

When the widening work was completed on the Washington side in February, it was necessary to ferry the 440-ton Bucyrus-Monighan dragline across the river to the Island, where it began excavating the loose material within the coffer-dam while the seepage tests were being made. A description of how the dragline was barged across the Columbia

● *Here the coffer-dam has been de-watered and excavation started. The 35-yard LeTourneau buggy is equipped with 16 air wheels.*



● *The Bucyrus-Erie 75-B electric dragline cleans up along the Bradford Island side of the river.*

appeared in the April 1935 issue of EXCAVATING ENGINEER.

Preliminary Excavation Rushed

Excavation of sand, gravel and boulders within the coffer-dam is now going on, with the expectation of reaching bed rock before high water this year. The Bucyrus-Monighan, equipped with an 8-yard Bucyrus-Erie bucket, loads to a fleet of nine Le Tourneau buggies, drawn by Caterpillar Diesel 75s. These haul the dirt and rock to the dump about 300 to 500 yards away on the Island.

Construction Program Outlined

When high water comes in June, the coffer-dam will be overflowed, and all operations there will cease. Little scour into the coffer-dam is anticipated. Following the subsiding of the water, which may be expected about July 15, the coffer-dam will again be de-watered, and during the low-water period of 1935-36 the excavation will be completed as quickly as possible. All equipment will be concentrated on this phase of the work. The construction schedule calls for the pouring of the south half of the dam, up to elevation-5, this fall.

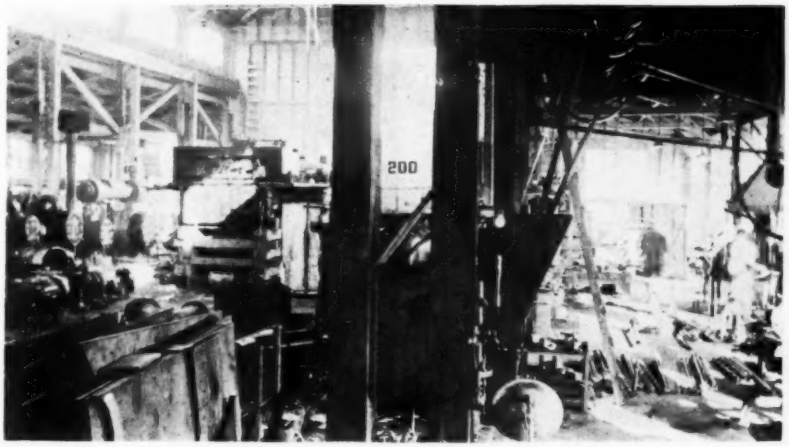
Construction of the north coffer-dam will be carried on to completion during this low water period. Then during the 1936-37 low water period, the north half of the dam will be poured complete, as will also the south half, from elevation-5 to completion.

A cableway spanning the river will be built to serve the form-construction and concrete-pouring operations. The aggregate storage, cement storage and batching plants will be built on the Washington side, although no details of these are as yet available.

Equipment Well Maintained

The Columbia Construction Company maintains all equipment in first-class running order. Daily inspections and adjustments aid materially in reducing the number of serious breakdowns, for many minor faults are corrected before they have an opportunity to develop. A well-equipped machine and repair shop is maintained on Bradford Island with 60 men, on the average, employed there.

The Columbia Construction Company, contractor on the main spillway dam, is headed by Henry J. Kaiser, President. Edgar F. Kaiser is Administrative Manager in charge of the job. Clay P. Bedford is General Superintendent; George Havas, Chief Engineer; and A. Donaldson, Office Engineer.



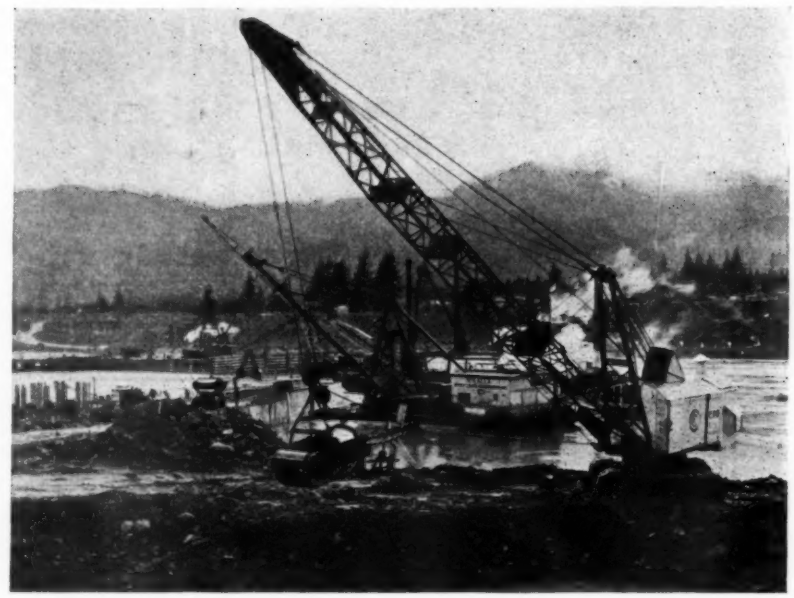
● *Columbia Construction Company maintains a well equipped machine shop for servicing and repairing equipment.*

Powerhouse and Lock Construction Runs Over $5,000,000

On July 31, 1934, General-Shea Company, a combination of the General Construction Company, Seattle, and J. F. Shea Company, Inc., Portland, was awarded a contract for $3,895,592 for completion of the locks and the building of the powerhouse substructure. Shortly after the award, the plans were changed, and the building of sea locks in place of barge locks was authorized. This increased their depth by 11 feet and their length by 140 feet, thereby adding approximately $1,2000,000 to the General-Shea contract.

● *Over 2½ yards of dirt on the way!*

On the first of April this year, the lock excavation had been substantially completed. The approaches were straight shovel work, while the main part of the locks, mostly in rock, required blasting. Six Northwest shovels handled the excavation, loading to both trucks and tractor units. Trucking was sublet to D. H. Whitley of Spokane, Wash. When grades were excessive, recourse was had to six Linn tractors equipped with sideboards, giving them a capacity of 10 to 12 cu. yds. The total yardage excavated amounted to approximately 75,000 yards of rock and 255,000 yards of intermediate and common.



● *The cribs for the coffer-dam were floated into place and then filled with rock and dirt dug by the Bucyrus-Erie 75-B electric dragline.*

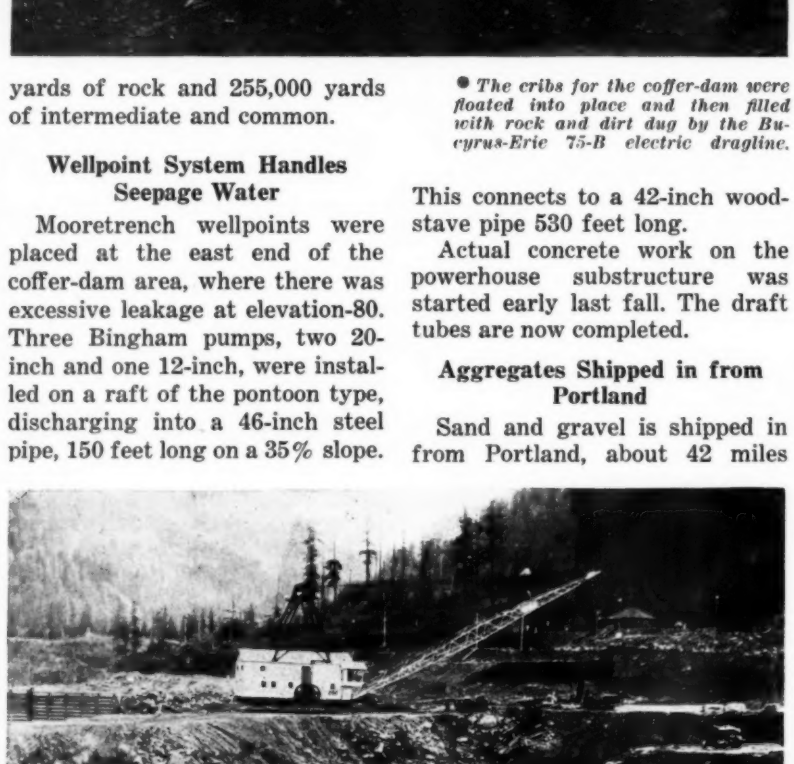
Wellpoint System Handles Seepage Water

Mooretrench wellpoints were placed at the east end of the coffer-dam area, where there was excessive leakage at elevation-80. Three Bingham pumps, two 20-inch and one 12-inch, were installed on a raft of the pontoon type, discharging into a 46-inch steel pipe, 150 feet long on a 35% slope. This connects to a 42-inch wood-stave pipe 530 feet long.

Actual concrete work on the powerhouse substructure was started early last fall. The draft tubes are now completed.

Aggregates Shipped in from Portland

Sand and gravel is shipped in from Portland, about 42 miles



● *Excavation within the coffer-dam is well under way. On the lower level, the Bucyrus-Erie 75-B electric shovel is taking out rock.*

● *The Bucyrus-Monighan dragline started preliminary excavation within the coffer-dam without waiting for dewatering to be completed.*

distant, where the contractor has built a plant especially designed to produce material which will meet the exacting specifications set up by the U. S. engineers. Here, the sand and gravel, dredged from the Willamette River and Columbia River slough, are washed and classified. Sixty-car trains transport the aggregates to Bonneville, and thence over a spur to the storage plant on Bradford Island.

The storage capacity is 16,000 cu. yds. in open piles. The cars dump into a track hopper, and the sand and gravel are then elevated 80 feet by a 30-inch inclined conveyor belt, which discharges to another 30-inch conveyor belt, 451 feet long, extending over the storage piles. The aggregates are discharged from this conveyor at the desired points by a 30-inch Dodge tripper.

Reclaiming is done by means of a tunnel under the storage piles, in which runs another conveyor belt 30 inches in width, and 460 feet between centers. Radial gates admit the materials from the piles to this conveyor, which delivers them to a 30-inch incline conveyor, 400 feet long, which in turn carries them to the bins in the top of the batching plant.

Cement, furnished by the Oregon Portland Cement Company and Beaver Portland Cement Company, comes in bulk. It is unloaded from the cars into a hopper by means of a small, manually-operated dragline scraper. From the hopper, by means of a Fuller-Kinyon pumping unit, the cement is pumped to the batching plant, or to the storage silo above, as needed.

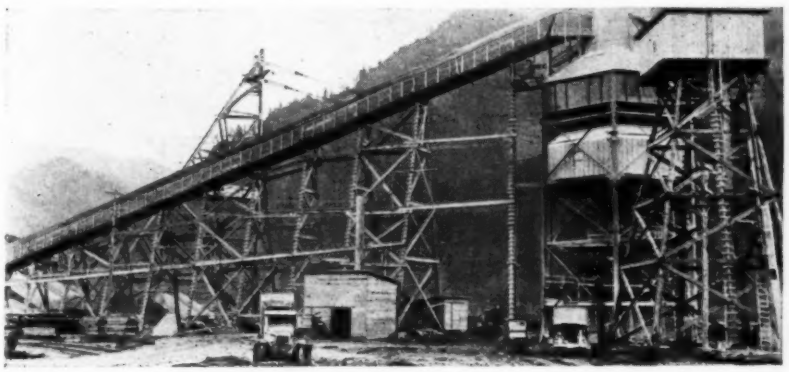
● *This silo has a storage capacity of 15 carloads of cement.*

● *General-Shea's batching and mixing plant is controlled by one operator. The inclined conveyor carries aggregates from the storage piles to the batch bins.*

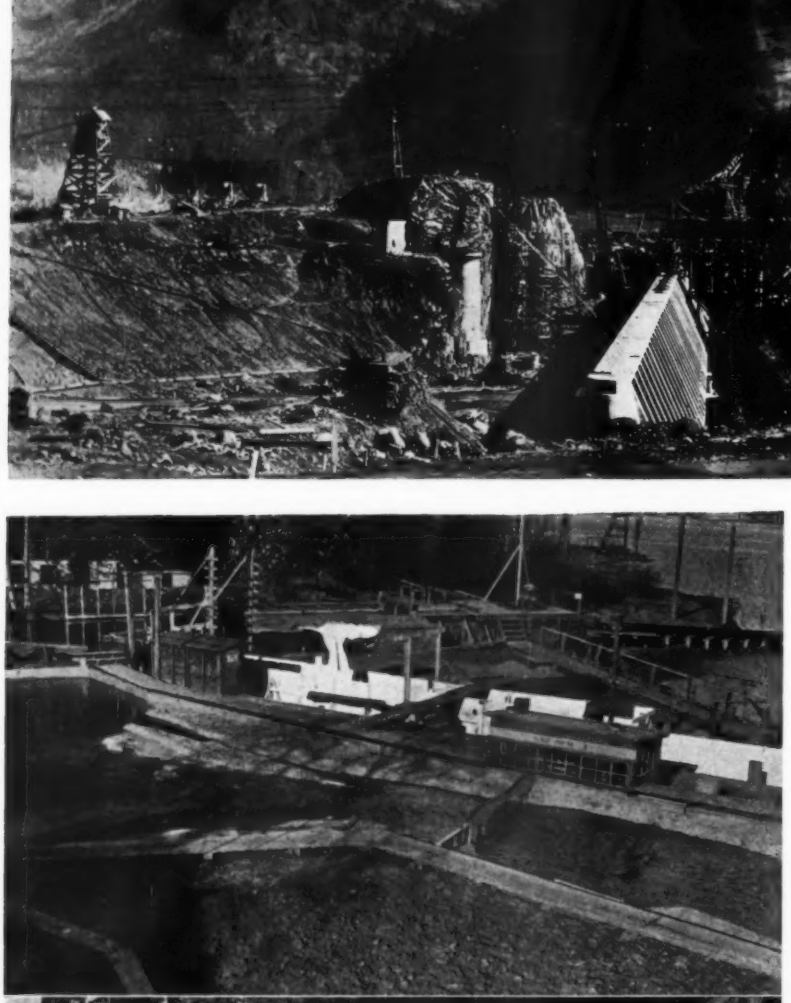
One Operator Runs Batching and Mixing Plant

The batching plant, designed and fabricated by C. S. Johnson Company, is located on the brow of the cliff overlooking the power house excavation. It rises 100 feet in the air, and has a capacity of 2,000 cu. yds. of concrete a day.

The top of the batching plant contains a centrally located cement compartment of 750 barrels capacity. Radially disposed around it are the aggregate bins, totaling 1,200 tons capacity. Two classifications of stone and three of sand enter these bins, through a distributing chute, from the conveyor coming from the storage piles.



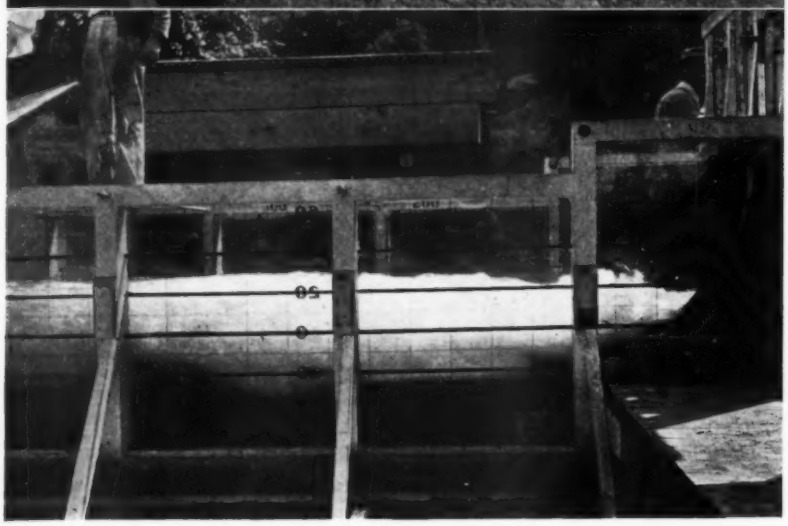
● *The excavation for the locks has been completed and the south guide wall erected.*



The bins discharge to the weigh batchers on the floor below. Here also is the control station for the entire plant. The weigh batchers, seven in number, are operated by air, and provided with interlocks. The weighing is done automatically with an accuracy of within one per cent.

The weight of each kind of material in every batch, as well as the consistency of the concrete, are shown by a graphic recorder on a single continuous sheet of paper, coordinated and accurate to one per cent. Kron scales, pendulum type, and two Koehring batch mixers are used.

There is only one operator for the whole plant. From his position on the batching floor, he has full view of the batchers, as well as the recorder and consistency indicators. Through floor windows, he sees the mixers. Through



● *Top: The research laboratory at Linnton, Oregon, studies the action of the Columbia River at Bonneville Dam as shown by this miniature section built on a scale of 1 to 100. Below: In this special section of the model, the scouring action of the water through the spillway is observed.*

windows on the side, he can see the shuttle train which carries the concrete to the loading platform, where the hi-line bucket receives it and conveys it to the forms on the powerhouse site. Everything is interlocked, so that a mistake is impossible. He cannot short mix, nor can he charge an un-dumped mixer, or one not in a position to be charged. Lights indicate when each operation is finished and the next one is to begin.

From the batchers, the materials discharge through a collecting cone and swivel chute to either of the two 3-yard Davis concrete mixers below. These discharge into a double hopper dump car of six yards capacity, which is drawn by a Plymouth Type 6 Model DLC locomotive. The train operates over a shuttle 250 feet long to the loading platform, synchronizing with the 1½-minute mixing period of the weighing and mixing plant. The car dumps to a 6-yard bucket traveling on the cableway direct to the forms. After the concrete is poured, it is mechanically vibrated by means of "Viber" machines.

The cableway, using Roebling and Leschen cables, has a span of 1390 feet. It extends from an A-frame on Bradford Island to two movable tail towers on a radial track, 600 feet long, on the hillside above the locks. Concrete for the ends of the locks and a small port of the powerhouse substructure, which cannot be reached by the cableway, will be placed by a Rex Pumpcrete unit, operating on the loading platform.

The work of the General-Shea Company is under the supervision of Ben Cook, Superintendent.

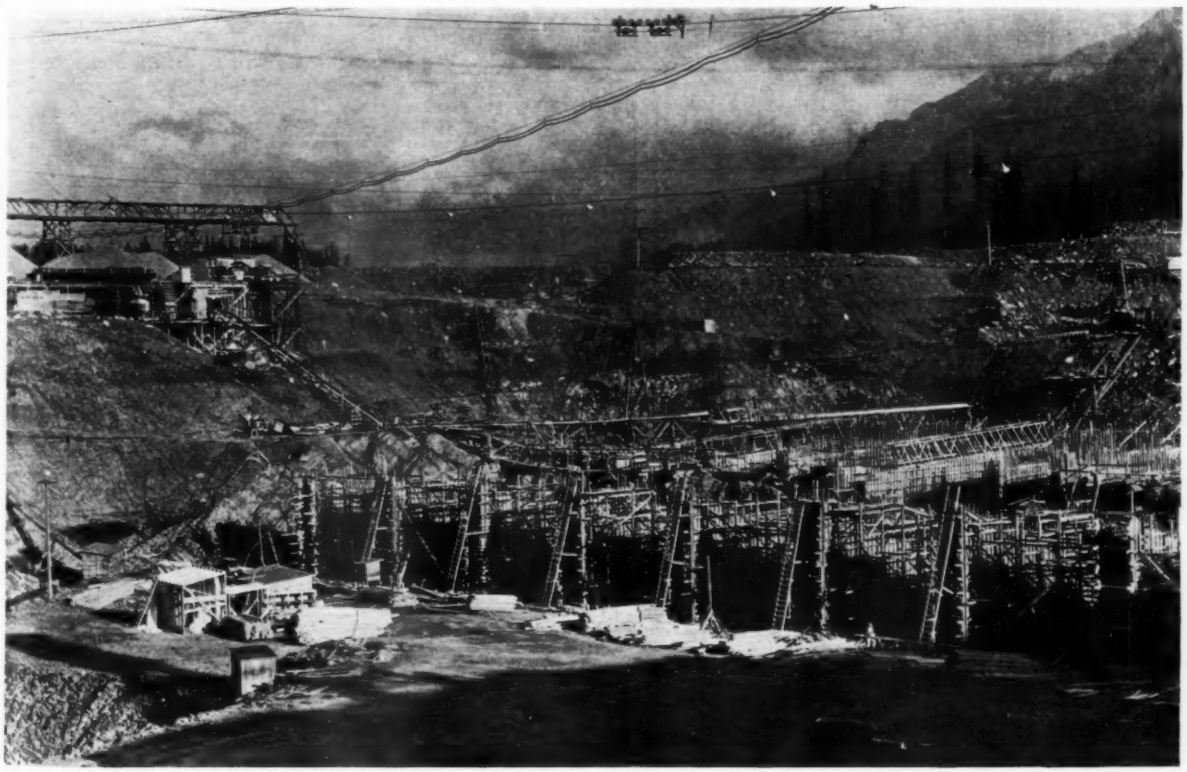
● *A general view of the powerhouse site. The cableway transfers the concrete from the loading platform (at the left) to the forms.*

Work Planned and Checked by Model

This brief outline would not be complete without reference to the extremely valuable research work being carried on at the Linnton Hydraulic Laboratory, located on the Willamette River at Linnton, Oregon. Here, the U. S. Engineers have constructed a model of the Columbia River, representing a stretch of five miles above and below the dam, and built on a scale of 1 to 100. This is said to be the largest and most complete model of its kind ever made. It is 325

(Continued on page 252)

● *One operator controls all batching and mixing operations in General-Shea's concrete plant.*



Novel Machine Places Concrete

Metropolitan Water District forces use special concrete handling machine to line Aqueduct tunnels

By JOHN R. MARCY

CONCRETE for the tunnels on the Coachella Division of the Colorado River Aqueduct is being mixed and placed by a unique machine built for the Metropolitan Water District by Brown-Bevis Equipment Company of Los Angeles at a cost price of $15,400. It is in use now on the Wide Canyon project.

This machine combines a one-yard mixer, agitator, and Pumpcrete unit on a structural steel frame mounted on car wheels. Cement and aggregates are delivered to the machine in batch bodies, similar to those used on trucks, which are mounted on the frames of tunnel cars. The batch bodies are lifted and dumped mechanically by a hoist on the machine frame.

The concrete from the mixer discharges into a rotating agitator which prevents loss of concrete during a temporary shut down, or allows an occasional batch, found too wet or too dry, to be remixed. Concrete is delivered continuously to the forms by the Pumpcrete. Packing the concrete in the arch is accomplished by submerging the end of the Pumpcrete pipe, thus building up the necessary pressure. The use of the Pumpcrete for this type of work is not experimental, since it was successfully used in placing the concrete lining in the power plant and spillway tunnels at Boulder Dam.

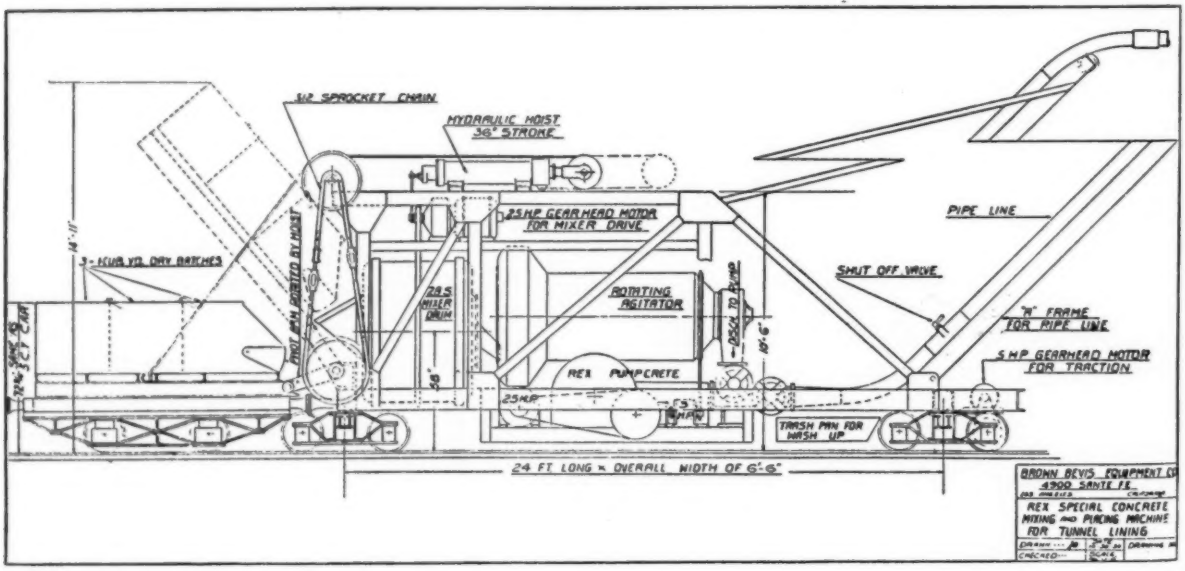
● *Above: A finished section of tunnel on the Aqueduct. Below: This sketch shows the machinery lay-out of the concreting unit.*

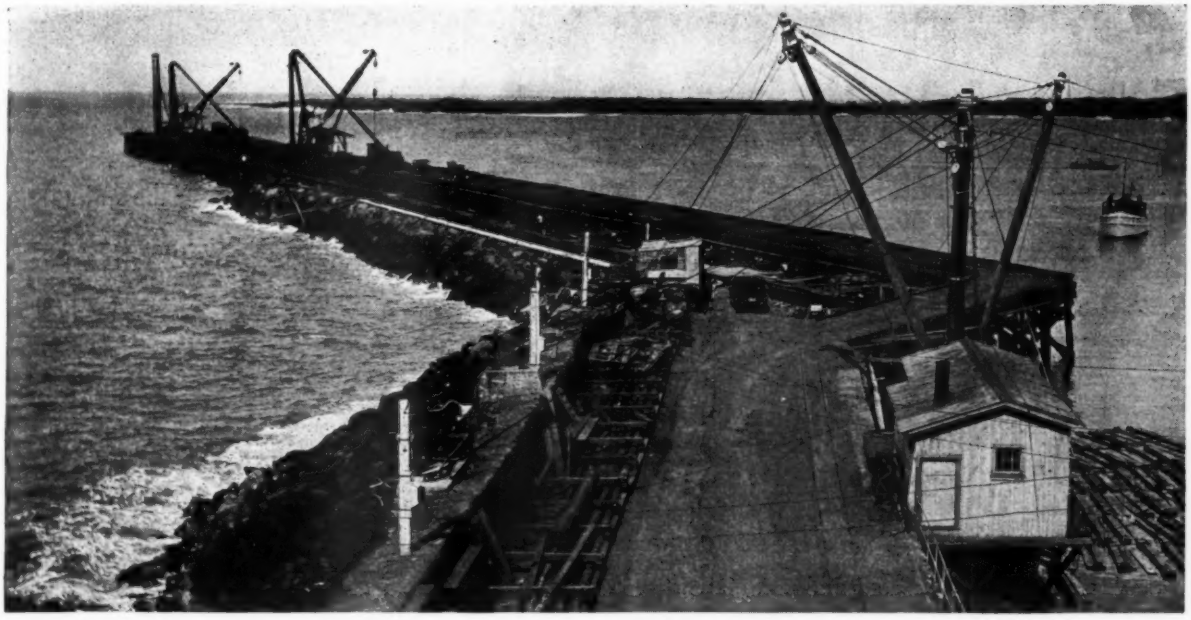
District engineers estimate that the assembled machine is delivering an average of about 20 cubic yards of placed concrete per hour. Its rated capacity is 30 cu. yds. per hour, and the capacity of the Pumpcrete unit is 40.

The equipment for hoisting, mixing, and placing is assembled on a heavy steel frame mounted on two 4-wheel trucks running on a 36-inch gauge track. The machine is 24 feet in length between truck centers, 6 feet 6 inches in width overall; and 10 feet 6 inches in height from the rails to the top of the main frame. Four units make up the assembly: a standard Rex 28-S mixer; a Heil hydraulic, standard, self-contained hoist mounted horizontally on the frame over the mixer drum; a rotating agitator; and a Rex Pumpcrete and pipe line.

A power shaft, carrying three cable drums, is mounted on top

(*Continued on page 235*)


1/2 SPROCKET CHAIN
HYDRAULIC HOIST 36" STROKE
25 HP GEARHEAD MOTOR FOR MIXER DRIVE
PIPE LINE
3 - 1CUB. YD. DRY BATCHES
SHUT OFF VALVE
28.5 MIXER DRUM
ROTATING AGITATOR
"H" FRAME FOR PIPE LINE
5 HP GEARHEAD MOTOR FOR TRACTION
25 HP
TRASH PAN FOR WASH UP
24 FT. LONG x OVERALL WIDTH OF 6'-6"
BROWN BEVIS EQUIPMENT CO
4900 SANTE FE
REX SPECIAL CONCRETE MIXING AND PLACING MACHINE FOR TUNNEL LINING



● *The construction of the Port Allen breakwater was expedited by the use of this wide trestle with ample truck runways.*

New Breakwater Protects Port Allen Harbor

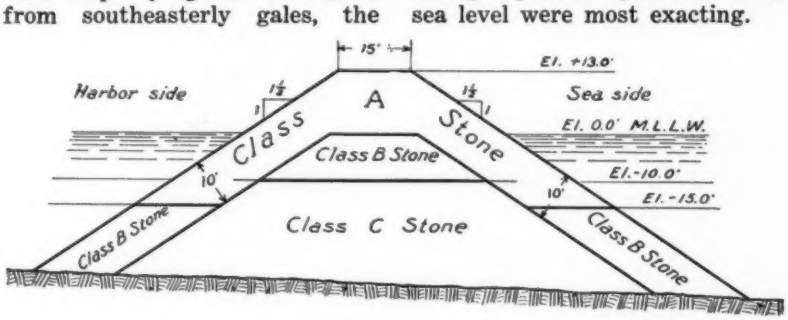
Hawaiian Dredging Company, Ltd., builds 1200-foot breakwater with rock from lava bed

By JOEL B. COX
CIVIL ENGINEER, KAUAI RAILWAY COMPANY

OF GREAT importance to the Hawaiian Islands, and more particularly to Port Allen, on the Island of Kauai, is the 1200-foot breakwater, recently completed, which gives needed protection to that port, and to the ships using it. The breakwater, a PWA project, is of stone construction, and lies in water from 25 to 36 feet deep.

Kauai is the most northerly island of the Hawaiian Group. It is a mountainous island, circular in shape and thirty miles in diameter, with a central mass rising to an elevation of over 5,000 feet. A horseshoe of fertile land, near sea level, encircles the central mass on three sides of the island. This arable area of approximately 70,000 acres produces annually 200,000 tons of sugar and a million cases of canned pineapple. The movement of these products outward, with a countervailing inward traffic of supplies and merchandise, is all waterborne — mostly by direct shipment to the U. S. mainland. Over half this traffic is handled by Port Allen, the port for the southwest portion of the Island. To expedite this traffic movement, and to protect ships lying in the harbor from southeasterly gales, the Federal government appropriated $880,000 for the construction of the breakwater and necessary dredging within its protection. The dredging is being done by the U. S. Engineers using their own sea-going hopper dredges. The breakwater was built by contract.

The structure called for by the Federal specifications is shown by the accompanying cross section. Class A rock weighs not less than two tons, with all cap and slope rock averaging eight tons or over. Class B is quarry run with 30% two tons or more. Class C is quarry run without size restriction. The requirements for placing and fitting cap and slope stone above sea level were most exacting.



● *This cross section sketch shows the dimensions and arrangement of the three classes of stone placed in the breakwater.*

● *Cap stones had to be placed and fitted together with great care. This operation required a great deal of time.*

Construction Methods Outlined

Construction methods were largely dictated by the expected quarry conditions, the layout of the job, and the time schedule required, inasmuch as only about thirteen months were allowed for actual construction. In preparing the rock for blasting, prior to excavation, both blast-hole drills and coyote tunneling were employed. Shovels and cranes on caterpillar-type mountings handled the sorting and loading of the rock. Flat-bed trucks hauled the large rock and gateless dump trucks the smaller material to the breakwater. A pile trestle of unusual width, carrying two standard-gauge tracks, 40 feet on centers, and a truck runway with suitable turn arounds and passing places, was built the length of the breakwater. On the tracks ran two traveling stiff-leg derricks of 20-ton capacity. An average progress of 18,000 tons a month was made with this equipment, over half the time being given to meticulous setting, fitting and trimming of the Class A slope and cap rocks.

● *The use of the skip method of placing rubble enabled the contractor to build the breakwater accurately to dimensions.*

● *A cap stone is lowered to its proper place in the breakwater.*

Satisfactory Rock Hard to Find

To give the reader a better understanding of the problems confronting the breakwater builder, a brief description of Hawaiian geology is necessary here. The islands have been formed by successive volcanic eruptions which spread basaltic lava and ash in thin flows and beds over the sides of volcanic domes. These beds have then become deeply eroded by the abundant tropical rainfall. Further decomposure and soil-making processes have progressed rapidly under the joint influences of heavy precipitation, warm climate, and consequent luxuriant vegetation. As the Hawaiian volcanic flows have been highly fluid, the lava beds tend to be thin. These thin flows have been cracked with rapid cooling, shattered by successive eruptions, and further decomposed by the agencies stated above. Hence, unlike the massive beds of rock found in the Pacific Northwest on the mainland, the locating and quarrying of rock of adequate size for a breakwater is a major problem here—only to be solved by careful study.

The search for suitable rock was carried on by a skilled geologist, W. O. Clark, exploration being carried on by tunnels and an extensive diamond drilling program. As a result of this exhaustive search, suitable rock was found in a valley about a mile from the breakwater site. Here an ancient lava flow had completely filled an older, steep-sided valley, and had later been cut into by the present stream. In that portion of the valley where the lava had cooled slowly because of considerable depth, was found the stone required. This rock was available in three comparatively small, isolated

● *Left: A heavy blast opens up the quarry face. Right: The Bucyrus-Erie 50-B and P&H 206 dig into the blasted rock.*

masses, which, when opened up, were found to possess faces of comparatively short length. In height, the face ran from fifty to seventy feet, with an overburden of five to ten feet of earth. This overburden was, in general, washed off by 4-inch hydraulic jets using pressures up to 100 lbs. per square inch at the nozzles.

Two Bucyrus-Armstrong Blast-Hole Drills Used to Advantage

The prime aim of the drilling and blasting operations was to obtain the maximum production of large blocks weighing from 10 to 15 tons each. Two Bucyrus-Armstrong Model 33 blast-hole drills put down 5-inch holes. Keeping well ahead of the drilling schedule, they did the bulk of the work. A few coyote tunnels were used in connection with the larger shots. Although the cost of coyote tunnels per cubic yard excavated proved to be less than that of blast hole drilling, the difficulties and uncertainties of blasting in the very irregular formations were much decreased by employing the latter method. Holes were spaced about sixteen feet apart, and an equal distance back from the face. The height of face varied from forty to seventy feet.

The main blasts consisted chiefly of black powder, with charges computed to give barely enough movement to loosen, but not break up the rock more than necessary. With a quarry floor only a few feet above the water level, sub-drilling was impossible. The holes were therefore heavily sprung to keep the powder charge sufficiently low. The charges were set off by means of primers using 50 pounds of 40% quarry gelatin and Cordeau detonating fuse. Individual electric caps were used with the Cordeau at each hole. The usual charge was 1½ to 1¾ pounds of explosive for each cubic yard of material in front of the line of holes. As a back break of 10 to 12 feet was obtained, the turnout was about 0.8 to 1.0 cubic yard of material for each pound of explosive.

The largest shot was one using 13.62 tons of powder, and produced 22,000 cubic yards of rock. This was also the most successful shot from the standpoint of large rock production, about 40% of the product being 6 tons or over.

Loading Presents Unusual Difficulties

The same requirement of maximum large block production which governed the blasting operations caused the greatest obstacle to easy handling of material. Heavy enough charges to throw down and scatter the rock would have broken up the large blocks. Hence, it was necessary to pull out these blocks from a tightly packed mass of loosened stone, resulting in unusually severe service for the loading equip-

(*Continued on page 258*)

● *Sorting operations at the quarry consumed much time. Quite a number of "big ones" are set out here waiting to be hauled to the breakwater.*

EXCAVATING ENGINEER

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The Business Situation

THE FIRST quarter of the year has presented many interesting developments. There has been a great increase in the dollar volume of new bond issues. Industrial production has shown a slight dropping off from the month of January as a peak of the recent period of business improvement. There has accumulated in the banks of the county a great deal of idle money, that is, a great volume of demand deposits. The Government continues to be a much greater borrower of money than the corporations of the country. Major labor disputes have been less frequent. Business in general is watching developments in Washington with great interest, not unmixed with misgivings. More persons are doubting the wisdom of mortgaging the future by great increases in national debt. It is admitted that the new work relief bill with its $4,800,000,000 to be spent in public works of all kinds will bring about a temporary increase in business activities. The answer to the question of whether that increase will be permanent is not so certain. The problem of a large and increasing national debt, viewed by itself, is anything but a pleasant one.

There are several significant points concerning the increase in new bond issues. Apparently the revised Securities Act and the new regulations have appealed to business men enough so that they have undertaken to sell new issues—a procedure they have been afraid to follow for many months. However, this increase of new bond issues does not indicate an expansion of credit. It is apparently for the purpose of refunding present debts at the prevailing low interest rates. The significance of these two facts is that they apparently demonstrate that business men are still afraid to borrow money to finance improvements or new activities with the idea of making profits. Apparently they feel that the attitude of the government is still too uncertain to risk new ventures, even with the present very low interest rates.

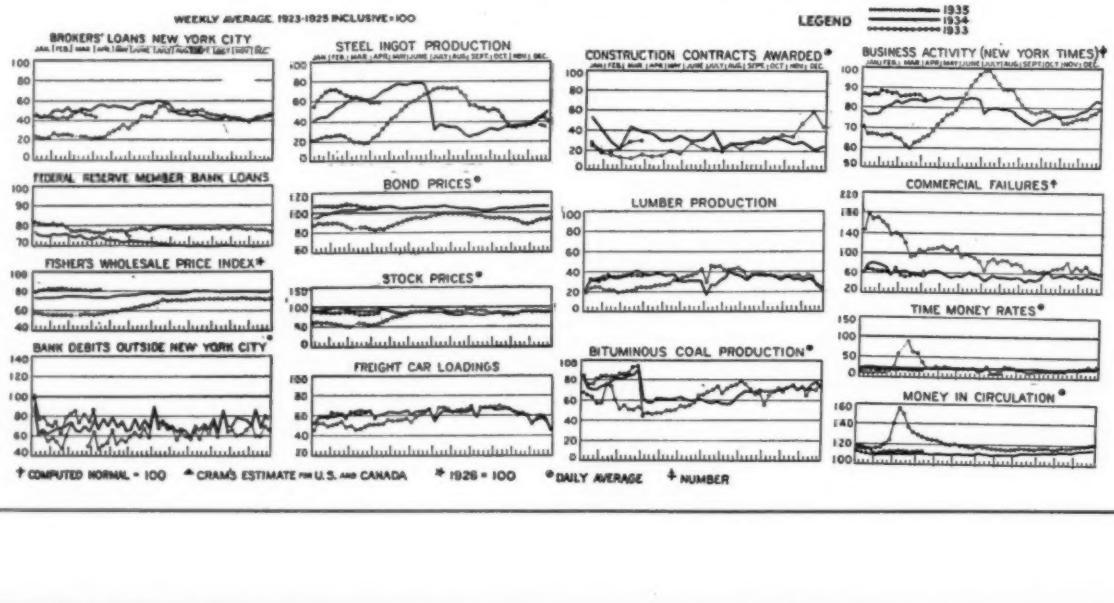
The constantly increasing Governmental borrowing and the very much decreased private borrowing is not a good combination. Governmental borrowing and large increases in the national debt suggest to business men the necessity for increased Governmental revenue and increased taxes in the immediate future, and acts as a warning to them that profits will be particularly hard to make under conditions which will exist in the future. It therefore acts as a deterrent to new enterprises.

The borrowing of private business, however, is not only an indication of faith in the future, of willingness to start new enterprises and undertake expansion; it is a very definite promise of increased business activity since the borrower must use the money to earn the interest obligation he has made. Repayment is not a matter of public concern, for it must be made as a result of the activity of the borrowing group, not from taxes collected by the Government from individuals and corporations.

March awards for residential building construction almost doubled the volume reported in February, according to F. W. Dodge Corporation. At the same time the residential total exceeded the March, 1934 volume by almost 15 per cent; in fact the March, 1935 contract volume for this class of construction, the Dodge organization reports, was the highest recorded since March, 1932, when the total for the 37 eastern states was only one million dollars greater than the volume of $32,207,400 reported for last month.

For the first quarter of 1935,

WEEKLY BUSINESS INDICATORS



residential contracts totaled $71,-234,400 in the area east of the Rockies. This was a gain of almost 23 per cent over the total for the first quarter of 1934; incidentally, an increase over the first quarter of 1933 of almost 78 per cent was shown while as compared with the corresponding period of 1932 the current year's first quarter total was about 16 per cent smaller.

Total construction awards during March in the 37 eastern states amounted to $123,043,500. Besides residential building, this volume included $44,581,600 for non-residential buildings, $39,-779,400 for public works; and $6,475,100 for public utilities. The March contract volume for all classes of construction recorded a gain of 64 per cent as compared with the February volume of $75,-047,100. Compared with the total of $178,345,800 for March of last year, however, a loss in excess of 30 per cent was registered.

For the first quarter of 1935, total awards amounted to $297,-864,500 in the 37 eastern states as against $461,525,800 for the corresponding quarter of 1934. In this connection it should be recalled that a year ago the PWA program was approximately at its height.

William P. Curley

WILLIAM Parnell Curley died March 26 at Stranger's Hospital, Rio de Janeiro, Brazil, following an emergency operation. Superintendent of the Companhia Merdonial de Mineracao, manganese mining subsidiary of the United States Steel Corporation operating at Lafayette, Minas Geraes, Brazil, Mr. Curley was a man of admirable qualities and great personal charm. He was widely known in mining circles for his ability, integrity and character. He was taken suddenly ill at the mine, a week before his death, and was immediately hurried by special train to Rio de Janeiro, a distance of 300 miles. Even though the best of medical skill was secured, death came soon after the operation. His many friends were greatly saddened by the news of his wholly unexpected death.

Mr. Curley, 50 years old at the time of his death and unmarried, was a native of Negaunee, Michigan. Upon graduating from the Michigan College of Mining and Technology at Houghton, Mr. Curley went to Chisholm, on the Mesabi iron range, to work for the Oliver Iron Mining Company. In the spring of 1921, he left Minnesota to go to Brazil where he remained until his death.

He is survived by his brother, M. Curley of Ajo, Arizona, manager of the New Cornelia Division of the Phelps Dodge Corporation, and two sisters, one of whom resides in Butte, and the other in Chicago.

The body was brought a distance of about 6,000 miles by sea and land to his boyhood home in Negaunee, Michigan, where many friends of the Curley family reside, and where the funeral services were held on April 13.

Novel Machine Places Concrete

(*Continued from page 230*)

of the frame for hoisting the batch bodies. This shaft is rotated by a cable connected to a hydraulically-operated plunger with a 36-inch stroke. Independent dead end cables on the two end drums attach to either side of the body, and another power shaft near the bottom of the frame, engages the dump body through pivot arms. This lower shaft, rotated by a Rex chain working on a sprocket on the first shaft, elevates the dump body to the height wanted for discharging into the mixer.

The rotating agitator is equipped with screw blades which propel the concrete to the discharge end of the cylinder, similar to the action of a truck mixer. The Pumpcrete has a single cylinder, capable of handling concrete containing 3-inch aggregate. The line to the forms is a 7-inch pipe carried on an "A" frame.

Four motors, totalling 58 H. P., operate the machine. The mixer is driven by a 25 H. P. motor, which is also connected to the hydraulic hoist by a chain drive. The Pumpcrete unit is powered with another 25 H. P. motor using a V-belt drive to the pump countershaft. A 3 H. P. gear head motor drives the agitator through a chain drive. A 5 H. P. gear head motor, through a chain drive, supplies power to the axles of the rear truck. When the machine is moved by a locomotive, a jaw clutch on the axle disengages the drive sprocket.

Two men are required on the machine, one to operate the mixer and the other, the Pumpcrete. The material cars are handled by a switching crew who attach and detach the lifting cables.

1½ Billions Available for Highways

ACCORDING to a summary made by the American Road Builders' Association, the money available for highways, streets, and grade crossing elimination projects for 1935 and 1936 amounts to almost one and one-half billions of dollars derived from the following sources:

Amount available from the National Industrial Recovery Act and the Hayden-Cartwright Bill	$ 62,000,000
Amount available under Works Relief Bill	800,000,000
Federal-Aid provided under Hayden-Cartwright Bill, June, 1935	125,000,000
State funds for matching Federal-Aid (1935)	125,000,000
Federal-Aid, June, 1936	125,000,000
State funds for matching Federal-Aid (1936)	125,000,000
Amount of state funds available for highways after matching Federal-Aid (conservatively estimated over 2-year period)	100,000,000
TOTAL AMOUNT AVAILABLE FOR 1935 and 1936	$1,462,000,000

EQUIPMENT
You Ought to Know About

Improved Explosive

NITRAMON, a revolutionary new blasting material for use in quarries and in other blasting operations such as stripping, was recently announced by E. I. Du Pont De Nemours & Co., Inc., Wilmington, Delaware. This new product, it was stated, cannot be detonated by the strongest commercial blasting cap, by impact, by flame, nor by shooting a rifle bullet into it. In actual use, it is exploded by means of a large diameter cartridge of dynamite. It is non-headache producing, non-freezing, and is rendered absolutely water resistant by being sealed up tightly in a tin can. The new product will be marketed only in large diameters, four-inch, four-and-one-half inch, five-inch and seven-inch. It has been designed specifically to fulfill as nearly as possible the ideal qualifications for use in quarries and in coal stripping operations. The fact that it cannot be detonated by any of the ordinary means used to detonate explosives makes it safe for transportation in a degree hitherto unknown for any blasting agent.

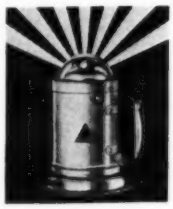
Convertible Motors Announced by Harnischfeger

AN ENTIRELY new line of convertible squirrel-cage and slip-ring induction motors, offering all standard frequencies for service ranging from 110 to 220 volts has just been announced by the Harnischfeger Corporation, West National Avenue, Milwaukee, Wisconsin.

Built in accordance with N. E. M. A. standards, the manufacturer states that the outstanding feature of these new P&H motors is their ready convertibility from open-type to fan-cooled, splash-proof or totally-enclosed construction. This is accomplished through the design of the frame, end heads and bearings to permit interchangeability in the four above mentioned types of single or multi-speed squirrel-cage and slip-ring motors. Other interesting features include: the unique mounting of the stator laminations which are stacked between heavy steel end-rings and the entire assembly then welded to the frame; the assembling of rotor windings from round or rectangular hard-drawn copper bars which are placed in the rotor slots without insulation or slot wedges and brazed to the end rings.

Delta Electric Announces Powerflare

THE ACCOMPANYING illustration shows the new Delta f-l-a-s-h-i-n-g POWERflare — a positive safety beacon for trucks, buses, street repairs, highway work, emergency crews, etc. manufactured by the Delta Electric Company of Marion, Indiana. The unit is small (less than 7" high by 4½" diameter), easily portable and it operates economically on a standard six-volt lantern battery, good for 40 hours or more. According to the manufacturer the powerflare has won the approval of contractors, road builders and truck operators because of its economy and greater safety.



General Electric Mining Cable

A NEW CABLE with loom-woven sheath, for use on mining machines, reel locomotives, and other applications of a similar nature where the cable must withstand severe mechanical abrasion, is now available from General Electric. The finish of this cable consists of a circular-loom-woven sheath, applied in a manner similar to the weaving of a carpet. Under this sheath is a layer of Glyptal cement, the sheath being so applied that it is embedded in the Glyptal cement and partially embedded in the rubber insulation. This process results in a cable that is tough, extremely abrasion resisting, and, because of the Glyptal cement, highly resistant to oil, alkali, and acid.

Complete information regarding the equipment mentioned on this page may be had by writing the manufacturers. We will appreciate your mentioning EXCAVATING ENGINEER.

White Announces 1935 Truck Line

THE WHITE MOTOR Company of Cleveland, Ohio, announces a complete line of ultra-modern trucks for 1935. Greater performance and improved economy are stated to be the keynote features of the new Whites, with modern load distribution, hydraulic and air brakes and ease of handling in traffic important advantages. Greater emphasis has been placed on streamline style features, particularly in the lighter models, in line with the present day demand for beauty of appearance. The 1935 models of the 700 series meet every gross weight requirement from 8,000 pounds to 60,000, including tractor and six-wheel units.

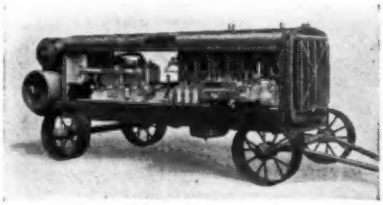
Austin-Western Trail Cars

A LINE of trail cars (in 8 to 25-ton sizes) for handling coal, ore, rock, dirt or other materials of heavy weight and bulk has been announced by the Austin-Western Road Machinery Company, Aurora, Illinois. Engineered for maximum pay-load operation, these cars, on rubber tires, have features similar to those employed by recognized builders of railroad dump cars. Equipped with bottom or side-dump doors operated by air, hydraulic or manual controls, A-W trail cars come in three standard body designs, including special, built-to-order constructions.

According to the manufacturers, these trail cars will haul more than double the load that a truck tractor can carry on its own chassis. Features include a full-universal, gravity-cushioned fifth wheel for traveling over rough surface without strain or distortion; generous ground clearance for easy dumping; low overall height for quick, convenient loading; dumping controlled by truck driver from cab; short turning-radius with ample clearance; massive, semi-elliptic springs, mounted directly under center sills; automatic, safety dumping devices, etc.

Schramm Announces Diesel Driven Compressor

ACCORDING to an announcement by Schramm, Inc., West Chester, Pa., they now offer their two-stage compressors powered by Caterpillar Diesel engines, giving the operator the in-



creased efficiency of two staging plus economy of Diesel engine operation. By adopting the Caterpillar Diesel engine the manufacturer states he has selected the leading industrial engine which has a world wide reputation for dependability and economy of operation. These two-stage Schramm compressors powered by Caterpillar Diesel engines are available in five sizes and can be secured with any type portable compressor mounting.

New Scarifier Points

SELF-SHARPENING scarifier points have recently been announced by A. B. Wilson & Son of Fayetteville, New York. The manufacturer states the use of this new point eliminates the heel resistance caused by a dull point because it is self-sharpening. The point is made with a rib-supported heel which peels away as the points wear. The method of fastening eliminates all pins, bolts, and nuts from contact with the road and it is an easy matter to replace a worn point with a new one.

Improved Blueprinter

A BLUEPRINT machine which utilizes the new Angstrom blueprint lamp has been placed on the market by Milligan & Wright Company, 4734 Prospect Avenue, Cleveland, Ohio.

According to the announcement the Angstrom lamp, used in this machine, offers many advantages over the conventional arc and mercury vapor lamps. It operates from the regular 110-115 D. C. or A. C. lighting circuit without the need of transformer choke coils, etc. It differs from the ordinary incandescent lamp in the quality of light produced being stronger in the blue end of the spectrum. Additional features of the machine are that one print can be made as economically as a dozen, it can be operated by anyone without danger of accident or fire, and no special electrical equipment is required.

Complete information regarding the equipment mentioned on this page may be had by writing the manufacturers. We will appreciate your mentioning EXCAVATING ENGINEER.

New Emergency Carbide Light

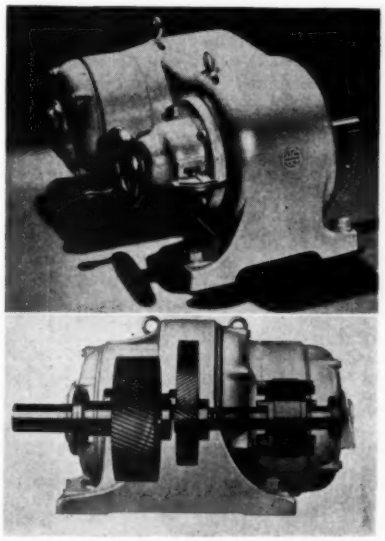
A NEW CARBIDE emergency light weighing only forty pounds when fully charged, and which burns for three hours, giving 8,000 candle power, has recently been announced by the National Carbide Sales Corporation, Lincoln Building, New York City, for use in the construction field. The reflector is mounted on a universal swing joint, so that the light may be shifted to any angle and may be easily folded down for carrying by a convenient handle above the carbide hopper. The unit is three and one-half feet high when extended for use, and twenty-eight inches when folded. A 1¾-pound charge of carbide placed in the hopper is sufficient for over three hours. The light may be operated intermittently, as needed, without the waste of any of the charge. By throwing a lever, the carbide is released, a few grains at a time, into the water tank below, and the rate of feed of the dry carbide is regulated automatically by the gas pressure.

Heavy Duty Trailer

THE C. R. JAHN CO., 760 Polk St., Chicago, general distributors for the LaCrosse Tu-Way Trailer recently announced a new, heavy duty trailer of the goose-neck type with new features. The main beam runs through from rear end to front end. The goose-neck is secured by cutting one flange bending, taking a triangular piece out of the web, and welding it back together again. Thus the beam is never cut through but retains its original strength according to the announcement. Braking is provided on all four rear wheels, either mechanically, vacuum or air controlled. Pneumatic-tired trailers use the new heavy duty, small diameter tire developed by the Goodyear Company. These tires are less than 30 inches in diameter, materially lowering the platform height over the usual conventional design of this type.

Variable Speed Motors

A NEW DEVELOPMENT in variable speed motors is announced by the U. S. Electrical Mfg. Co., whose engineers have incorporated as an inherent part of the U. S. Varidrive Motor an application of the Syncrogear. The Varidrive Motor, which has met with success in many industries, now is available with gears for increasing or diminishing the speeds, thus enabling the operator to obtain an infinite number of speed selections. A new bulletin illustrating this development



in motor design may be procured from the U. S. Electrical Manufacturing Company, 1510 South Western Avenue, Chicago, or 202 East Slauson Avenue, Los Angeles.

I just dreamed I met the most beautiful girl in the world, and she loved me at first sight."

"Go back to sleep and see if she's got a friend."

SHOTS *from the Firing Line*

Works Relief Bill Highway Funds

UNDER THE appropriations of the Works and Relief Bill, $800,000,000 has been earmarked for highways and grade crossing elimination; and although the President has the power to vary the amount earmarked by 20 per cent, it is felt that the amount stipulated will be used, provided it can be quickly put under contract. Assuming that $500,000,000 of the funds will be used for highways, and $300,000,000 for grade crossing elimination, the American Road Builders Association has prepared the following list of apportionments to the various states as provided for in the Hayden-Cartwright Highway Amendment:

State	Basis of Apportionment "Highway, roads streets" Sec. 204 N.I.R.A. ⅓ Fed. Hwy. Act ⅓ Population	"Grade crossing Elimination" ¼ Population ¼ Mile F. A. Hwy. Sys. ¼ Mi. Railroad	Total
Alabama	$10,645,000	$ 6,219,000	$16,864,000
Arizona	6,590,000	1,956,000	8,546,000
Arkansas	8,595,000	5,493,000	14,088,000
California	19,865,000	11,382,000	31,247,000
Colorado	8,710,000	4,086,000	12,796,000
Connecticut	3,640,000	2,622,000	6,262,000
Delaware	2,310,000	663,000	2,973,000
Florida	6,660,000	4,350,000	11,010,000
Georgia	12,795,000	7,566,000	20,361,000
Idaho	5,700,000	2,610,000	8,310,000
Illinois	22,290,000	15,780,000	38,070,000
Indiana	12,670,000	7,872,000	20,542,000
Iowa	12,800,000	8,595,000	21,395,000
Kansas	12,805,000	7,932,000	20,737,000
Kentucky	9,555,000	5,682,000	15,237,000
Louisiana	7,410,000	4,950,000	12,360,000
Maine	4,300,000	2,202,000	6,502,000
Maryland	4,490,000	3,210,000	7,700,000
Massachusetts	8,365,000	6,330,000	14,695,000
Michigan	16,160,000	10,146,000	26,306,000
Minnesota	13,530,000	8,280,000	21,810,000
Mississippi	8,865,000	5,025,000	13,890,000
Missouri	15,415,000	9,492,000	24,907,000
Montana	9,425,000	4,284,000	13,709,000
Nebraska	9,925,000	5,556,000	15,481,000
Nevada	5,750,000	1,371,000	7,121,000
New Hampshire	2,425,000	1,272,000	3,697,000
New Jersey	8,020,000	6,114,000	14,134,000
New Mexico	7,365,000	2,742,000	10,107,000
New York	28,325,000	20,790,000	49,115,000
North Carolina	12,105,000	7,470,000	19,575,000
North Dakota	7,350,000	5,106,000	12,456,000
Ohio	19,670,000	12,840,000	32,510,000
Oklahoma	11,745,000	7,149,000	18,894,000
Oregon	7,790,000	3,633,000	11,423,000
Pennsylvania	23,965,000	17,703,000	41,668,000
Rhode Island	2,535,000	1,077,000	3,612,000
South Carolina	6,930,000	4,530,000	11,460,000
South Dakota	7,630,000	4,392,000	12,022,000
Tennessee	10,750,000	5,829,000	16,579,000
Texas	30,740,000	16,773,000	47,513,000
Utah	5,305,000	1,923,000	7,228,000
Vermont	2,370,000	1,128,000	3,498,000
Virginia	9,365,000	5,817,000	15,182,000
Washington	7,760,000	4,707,000	12,467,000
West Virginia	5,720,000	4,125,000	9,845,000
Wisconsin	12,370,000	7,734,000	20,104,000
Wyoming	5,690,000	2,178,000	7,868,000
District of Columbia	2,435,000	603,000	3,038,000
Hawaii	2,375,000	711,000	3,086,000
TOTAL	500,000,000	300,000,000	800,000,000

Bids Opened on Fort Peck Dam Spillway Structure

ADDISON-MILLER, INC., and Fielding and Shepley, Inc., St. Paul, submitted low bid April 3 of $3,985,423 for the construction of the spillway gate structure, cut-off structure, and appurtenant works at Fort Peck Dam.

Spillway Builders, Inc., Kansas City, now at work on the spillway excavation, were second with a bid of $4,307,426.

The low bidders' figures on this additional work included: 516,000 yards of open-cut excavation at $1.00 per yard; 126,900 yards of trench excavation, from $3.00 to $4.90 per yard, increasing with depth of cut; excavating 7,700 lineal feet of 5-foot diameter holes for foundation piles to 30-foot depth at $5.80 per foot, 3,000 lineal feet of holes deeper than 30 feet at $6.00; 5,000 lineal feet of 6-foot diameter holes to 40-foot depth at $6.50; 3,000 lineal feet deeper than 40 feet at $7.00 per foot. Approximately 287,700 yards of concrete and 11,000 tons of reinforcing steel are to be furnished and placed under this contract.

Work to be Resumed on San Gabriel Dam

By K. CAMPBELL

WORK ON San Gabriel Dam will be resumed shortly according to a recent announcement by the Board of Supervisors. Operations will start as soon as approval of new plans and specifications is given by Edward Hyatt, State Engineer.

Under the new plans, the dam will be built of material from Quarry No. 10, with the slopes widened in order to use the material considered waste under the original specifications. The base will be widened from 900 to 1800 feet and in place of the 5,000,000 cu. yds. originally planned, 8,000,000 yards of stone will be used. The estimated cost of the structure as now planned will come well within the $12,000,000 left from the bond issue of 1924, and will include a spillway to cost $1,500,000. The new plans have met with the approval of both the Flood Control engineers and the West Slope Construction Company. The contractor will put 400 men to work as soon as the final approval has been given on the project.

Asphalt Institute Holds Annual Meeting

AT THEIR recent annual meeting the Board of Directors for The Asphalt Institute, representing four-fifths of the major producers of the United States and Canada, re-elected B. L. Boye as its President. Mr. Boye has been with Socony-Vacuum for 35 years and now heads that company's asphalt and fuel oil activities. He stated that opportunities for expansion of the asphalt industry are greater now than ever before, citing use of asphalt in protecting Mississippi River banks, the greater use of asphalt in Public Works Highways, and the increasing speeds of cars, rendering flexible roads a necessity.

The Institute announced the opening of a regional office in Cincinnati; additional regional offices are also maintained in Washington, San Francisco and Kansas City.

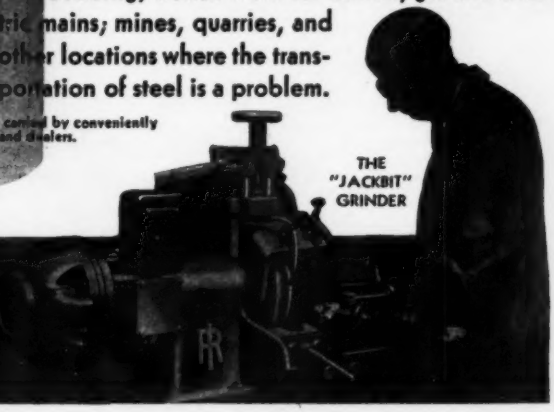
Resharpen Your "Jackbits"

You can resharpen "Jackbits" to the next smaller gauge by means of the "Jackbit" Grinder. Most sizes can be resharpened three times.

"Jackbits" are a distinctive form of detachable rock drill bits developed and manufactured exclusively by Ingersoll-Rand. The patented thread makes them easy to detach.

They are made in a complete range of sizes and types for use with "Jackhamers", drifters, wagon-mounted drills, and automatically rotated "Stope-hammer" drills. They are ideal for such jobs as road-building; trench work for sewers, gas and electric mains; mines, quarries, and other locations where the transportation of steel is a problem.

Large stocks of "Jackbits" are carried by conveniently located branches and dealers.



THE "JACKBIT" GRINDER

Ingersoll-Rand

11 BROADWAY NEW YORK CITY

For your convenience in writing to Ingersoll-Rand Company, you will find a card bound in this issue.

Shots From the Firing Line— *Continued*

Other officers elected at the annual meeting were: Vice-Presidents, A. M. Maxwell, Standard Oil Co. of Ohio; Leroy M. Law, Shell Petroleum Corp.; J. A. Blood, Standard Oil Co. of California, and T. M. Martin, Lion Oil Refining Co. of Arkansas. W. W. McFarland, President of the Warner Quinlan Co., was re-elected Secretary and Herbert Spencer, Standard of New Jersey, was re-elected Treasurer. The Board of Directors re-named C. W. Bayliss, Barber Asphalt Co., to be Chairman of the Executive Committee, and elected Messrs. McFarland, Martin and Blood as the other committee members, Mr. Boye being a member ex-officio. J. E. Pennybacker continues as managing director.

Status of Public Works Road Construction

FEDERAL funds amounting to $594,000,000 have been made available during the past two years for construction of roads under the administration of the U. S. Bureau of Public Roads. Since July 1933, more than 11,000 individual projects have been placed under way in the Public Works highway programs, according to Thos. H. MacDonald, Chief of the Bureau of Public Roads. Over 6,000 of these projects are off the Federal Highway system broadening the road program through the construction of connecting links such as principal thoroughfares of cities and towns on the one hand and feeder roads of the rural districts on the other.

The following table shows the extent to which funds already available have been put to use or obligated from June 1933 up to February 28 of this year. It will be seen that 54 percent of the funds now available have been spent for roads, the construction of which has been completed; this amounts to $321,132,716. The apparent discrepancy between total cost of completed roads and the amount of Federal funds spent was made up by the State or other subdivisions of the government.

Uncompleted work on which construction has been started amounts to 23.6 percent of the 594 millions of dollars. At this season of the year it would not be expected that the projects under construction would be a large amount. It should be observed, however, that of the apportionment made under the act of June 16, 1933 (1934 fund) 97 percent has been spent or is obligated for construction nearing completion. Only 39.5 percent of the 1935 fund of 200 millions has been actually put into active projects.

Of the remaining $132,806,208 less than 9 percent is from the 1934 fund. There are $66,337,828 of the 1935 fund still available for new road projects and this is being obligated as rapidly as agreements can be reached between the U. S. Bureau of Public Roads and the state highway departments.

It should be remembered that on July 1, 1935 another $125,000,000 will become available as regular Federal Aid funds to be matched by the states, and again on July 1, 1936, further Federal Aid in the amount of $125,000,000. These funds are entirely independent of the additional sum of $800,000,000 under the Works Relief Bill recently made available through the U. S. Bureau of Public Roads for highway construction and improvement.

Status of Funds and Road Mileage	Class 1 Projects on Federal Aid Highway System Outside of Municipalities	Class 2 Projects on Extension of Federal Aid Highway System into and through Municipalities	Class 3 Projects on Secondary or Feeder Roads	Summary of Classes 1, 2 & 3
Apportionments:				
1934 Fund	$185,392,844	$115,771,118	$92,836,038	$394,000,000
1935 Fund	94,506,322	49,248,077	56,245,601	200,000,000
Completed:				
Total Cost	178,207,281	89,318,109	79,089,024	346,614,414
1934 Fund	154,539,536	85,296,711	74,273,308	314,109,555
1935 Fund	4,389,933	1,094,993	1,538,235	7,023,161
Mileage	11,835.1	1,690.2	8,125.4	21,650.7
Under Construction:				
Est. Total Cost	79,060,311	36,681,384	39,706,763	155,448,458
1934 Fund	26,959,915	24,635,435	16,519,257	68,114,607
1935 Fund	41,337,258	9,595,416	21,012,795	71,945,469
Mileage	3,631.1	384.7	3,150.2	7,166.3
Approved for Construction:				
1934 Fund	1,296,512	2,499,782	895,409	4,691,703
1935 Fund	25,773,033	12,749,525	16,170,984	54,693,542
Mileage	1,698.2	266.5	1,596.1	3,560.8
Balance of Funds Available for New Projects:				
1934 Fund	2,596,881	3,339,190	1,148,064	7,084,135
1935 Fund	23,006,098	25,808,143	17,523,587	66,337,828

Billion-Gallon Increase in U. S. Gasoline Consumption Last Year

GASOLINE consumption in the United States in 1934, totalling 16,595,180,000 gallons, was the second largest in history, according to figures made public by the American Petroleum Institute's Department of Statistics. Total consumption in 1934 has been exceeded only by that in 1931, when the total reached 16,628,880,000 gallons. The 1934 consumption showed a gain of more than one billion gallons over 1933, consumption that year being 15,436,324,000 gallons. Consumption in 1932 was 15,497,158,000.

The department's reports are compiled from official data of the various states indicating the number of gallons upon which state gasoline taxes were collected, or which were exempted from taxation. The total, consequently, includes gasoline used for all purposes, rather than merely in motor vehicles.

Based upon this indicated consumption and an average retail price of 13.64c per gallon for gasoline in 1934, it is estimated that the American public paid roundly $2,263,582,552 for its motor fuel last year. In addition the public was taxed an average of 5.2c per gallon for a total of $862,949,360, or nearly 40 per cent of the retail price of gasoline. Exemptions and refunds, however, reduced this tax cost by about $100,000,000.

The following table shows the gasoline consumption in the individual states by gallons during the past two years:

State	Total Year 1933	Total Year 1934
Alabama	133,885,000	155,047,000
Arizona	64,506,000	73,219,000
Arkansas	121,195,000	140,156,000
California	1,323,482,000	1,334,177,000
Colorado	159,917,000	172,756,000
Connecticut	248,126,000	254,933,000
Delaware	40,210,000	41,556,000
Dist. of Columbia	104,852,000	103,734,000
Florida	205,568,000	236,775,000
Georgia	210,575,000	239,498,000
Idaho	52,314,000	65,770,000
Illinois	970,986,000	1,025,918,000
Indiana	439,009,000	465,438,000
Iowa	355,568,000	403,803,000
Kansas	349,928,000	378,781,000
Kentucky	166,292,000	184,367,000
Louisiana	163,139,000	178,457,000
Maine	107,583,000	116,993,000
Maryland	191,010,000	206,279,000
Massachusetts	561,164,000	587,789,000
Michigan	740,297,000	781,971,000
Minnesota	401,723,000	431,545,000
Mississippi	115,637,000	131,263,000
Missouri	465,876,000	489,401,000
Montana	69,844,000	85,484,000
Nebraska	194,698,000	223,372,000
Nevada	20,629,000	24,707,000
New Hampshire	65,871,000	70,649,000
New Jersey	698,779,000	734,521,000
New Mexico	48,342,000	56,154,000
New York	1,541,989,000	1,577,019,000
North Carolina	241,416,000	279,796,000
North Dakota	99,725,000	102,931,000
Ohio	886,640,000	955,479,000
Oklahoma	275,100,000	300,431,000
Oregon	158,904,000	165,978,000
Pennsylvania	1,048,463,000	1,136,344,000
Rhode Island	100,202,000	108,864,000
South Carolina	111,940,000	132,247,000
South Dakota	100,340,000	109,514,000
Tennessee	185,164,000	212,037,000
Texas	774,413,000	875,034,000
Utah	54,705,000	64,140,000
Vermont	44,151,000	48,550,000
Virginia	233,439,000	259,122,000
Washington	236,690,000	260,778,000
West Virginia	129,082,000	147,609,000
Wisconsin	387,490,000	420,725,000
Wyoming	35,466,000	43,934,000
Total	15,436,324,000	16,595,180,000

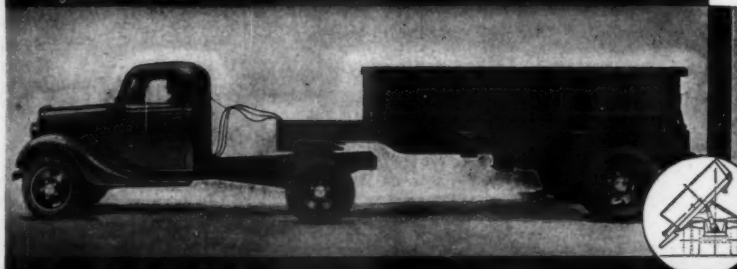
Rate Decision Announced

THE decision of the Interstate Commerce Commission in Ex Parte No. 115 leaves unaffected rates on crushed stone, sand and gravel, and slag, where the line haul rate is now $1.00 per net ton or less, including, with one exception, special sands hauled in open top cars. Rates in excess of $1.00 may, in general, have an emergency increase applied to them of as much

AUSTIN-WESTERN *Announces* 6 NEW MACHINES

Carry-All Scraper. Self-contained scraper, hydraulically operated, with its own motor, which forces load out. Open top permits loading by elevating grader or shovel.

● **Anticipating heavier demands on earth moving machinery in 1935 Austin-Western engineers first went into the field to determine the specific requirements—then designed and built equipment to meet them. Six new machines, announced herewith, offer every advantage based on modern earth moving methods. Each machine is very definitely superior to comparable equipment in the field. Send the coupon for bulletins.**



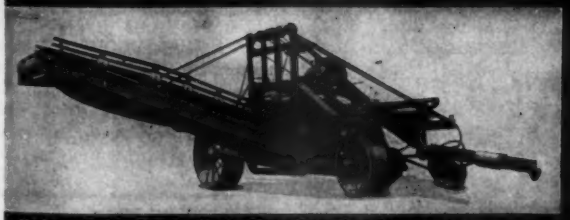
Section through center showing dumping mechanism.

Trail-Cars of 6- to 30-Yard Capacity. All-steel, most advanced pneumatic tire construction. Hydraulic controlled from cab. Two types: Side delivery (6 to 12 yard capacity), door clearance to handle anything that can be loaded. Hopper type (6 to 30 yds.) air or manually operated. Clamshell doors have 18 inch clearance for material spreading.

These units move more than twice the load of a body on a truck chassis. Suitable for 1½-ton truck tractors and up.

Ripper. Unbreakable. Cuts two feet deep. Teeth hydraulically raised, or forced into ground. Teeth, capped with manganese, easily changed.

Less overhanging weight at front of tractor. Adjustable push beams directly in line of draft. Hydraulic control of entire blade up and down, or of either end independently. **New Bulldozer.** Similar to Trailbuilder, but without push beam adjustment or blade-end control.



Hydraulically Controlled Elevating Grader. 3-wheel design trough type 48-inch carrier of huge capacity. Hydraulically controlled furrow wheel permits varying the width of the cut. Double acting hydraulic cylinder for "stiff leg" or "floating" operation of plow.

ROAD GRADERS · MOTOR GRADERS · ELEVATING GRADERS · DRAGS

ROAD ROLLERS

Austin-Western

DUMP WAGONS

BITUMINOUS DISTRIBUTORS · ROAD-MIX MACHINES · CULVERTS
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DUMP CARS

CRUSHING AND WASHING PLANTS · SWEEPERS AND SPRINKLERS · SHOVELS · CRANES · ETC · SNOW PLOWS

The Austin-Western Road Machinery Co.
C-9 Aurora, Illinois

Please send information on.....

Name.....
Company.....
Address..... State..... 463
City.....

For your convenience in writing to The Austin-Western Road Machinery Co., you will find a card bound in this issue.

Shots From the Firing Line— *Continued*

as one cent per hundred pounds (20 cents per ton) for the period to June 30, 1936. In the case of gravel and sand, industrial, hauled in closed cars, and naturally bonded moulding sand in either open or closed cars, rates at any level may be increased as much as two cents per hundred (40 cents per ton). The decision leaves unaffected rates established to meet truck and water competition, where such rates are so designated in the tariffs.

A study of the decision leads to the opinion that, so far as construction materials are concerned, it will have relatively little effect on the sand and gravel industry, since most traffic moves at rates of $1.00 or less. It will, however, make for an important burden on certain construction-materials-shippers and, in case of sands and gravels for special purposes, such as glass, foundry, etc., shipped longer distances with a high proportion of tonnage moving at a rate in excess of $1.00, the decision adds materially to the burdens of an important branch of the industry.

Advisory Board Designated for Bureau of Mines

TWENTY-NINE leaders of the mining and allied industries have accepted invitations from the Secretary of the Interior to act as an Advisory Board to the Bureau of Mines. The purpose of the board is to advise the Director of the Bureau, Dr. John W. Finch, on matters of Bureau policy affecting relations with the industry.

It is thought that such a board will be of invaluable aid to the Bureau by offering suggestions that might guide its activities toward a more effective service to the mineral industries. The exchange of views may lead to concerted action toward a better organization of the business of mineral production and a clearer conception of the economic problems affecting the industry.

National leaders of labor organizations were asked to serve on the Board, in view of the vital interest of workers in the Bureau's activities designed to improve health and safety conditions and to promote the prosperity of the mineral industry.

Members of the Advisory Board are designated to serve for a period of one year. The first meeting of the Board was held in Washington, D. C., April 15.

Progress on Public Works Highways to April 13, 1935

PROGRESS MADE on emergency construction of public works highways to April 13 under the supervision of the U. S. Bureau of Public Roads shows a total of 531 projects, estimated to cost $21,918,000, approved but contracts not yet awarded; 899 projects, estimated to cost $28,082,000, awarded but not yet under construction; 3,183 projects, estimated to cost $180,645,000, under construction; and 8,019 projects completed at a cost of approximately $355,165,000. The 3,183 projects under construction involve 8,368 miles of road, and are giving regular direct employment to 85,020 men.

New England Notes

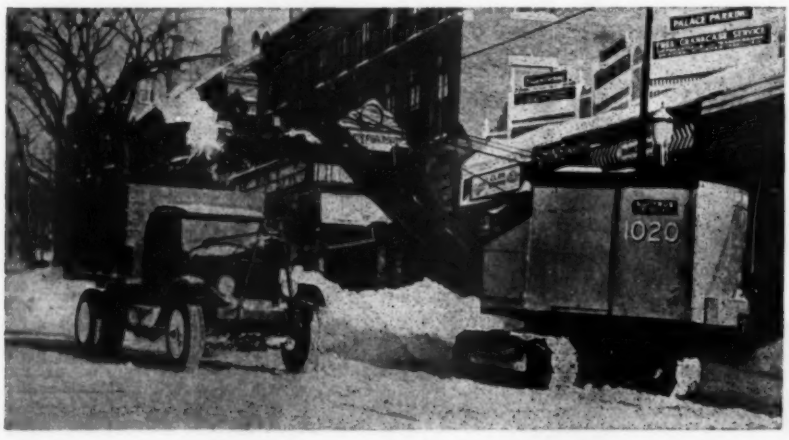
By M. E. POAG

E. L. Somers, Inc. Barre, Vermont, was low with a bid of $32,628, March 29 for grading 1.3 miles of road, including base course and drainage structures, near Wallingford, Vermont.

Arute Brothers, Inc. Bridgewater, Massachusetts, have been awarded the construction of approaches to bridge over Cape Cod Canal at Bourne, Massachusetts. There will be quite a bit of shovel work in connection with this project.

Joseph DeVries & Sons, Uxbridge, Massachusetts, were low with a bid of $52,500, March 19 for the construction of the Otis-Blandford, Mass., road.

If shovels had to dig nothing harder than snow, they would probably last forever. **The Street Department, City of Haverhill, Massachusetts,** put their Bucyrus-Erie 1020 shovel to good use during the past winter following a severe snowstorm. Shown below, the machine is working on one of the main streets clearing away the heaped up snow, and loading it to a truck fitted with unusually high sideboards.



New York Notes

By G. E. PETERSON

Low bidders at the state highway lettings since March 26 have been: **Joe Walker, Mayfield,** $26,370 for 3.85 miles of 18-foot gravel in Fulton County; **The Immick Company,** Meriden, Conn., $114,892 for 7.93 miles of retread in Westchester County; **Delaware Paving Company,** Oneonta, $39,584 for 2.25 miles of 18-foot gravel in Albany County; **Slattery Contracting Company,** Woodside, L. I., $96,562 for grading on the Grand Central Parkway extension in Queens County—260,000 yards of excavating; **Wilson & English,** New York, $237,155 for a grade separation on the Laurelton Parkway in Queens County; **West Shore Concrete Company,** Suffern, $70,960 for 2.88 miles of concrete in Rockland County; **Bates & Rogers,** Stapleton, S. I., $42,386 for overhead crossing on N.Y.C. R.R. in Oneida County.

Metropolitan Area low bids have been: **John Tully,** Bronx, $123,727 for a grade crossing elimination on the N.Y.C.R.R. at West 171st Street; **E. L. North Company,** Wantagh, L. I., $107,630 for reconstruction of bridge in Suffolk County; **Thomas Crimmons Contracting Company,** New York, submitted low bid removing existing substructure for Bellevue Hospital extensions; **Suburban Engineering Company,** New York, $389,810 for sewage treatment plant at Washington, D. C.

Ohio Notes

By H. F. UNGER

Agitation for Federal funds to straighten and dredge the Cuyahoga River at Cleveland is being carried on by William L. Day, Chairman of the Cleveland Port Commission, and Congressman Chester C. Bolton of Cleveland, before Maj. Gen. Edward M. Markham, Chief of the U. S. Army Engineers. They are requesting Gen. Markham to recommend that the $4,500,000 improvement be made a Federal project so it may be eligible for an allotment under the four billion dollar public works program recently approved by President Roosevelt. A crew, under the supervision of Captain Dan Henderson, is taking soundings at various points from the mouth of the Cuyahoga River to the Otis Steel Company's dock. The results of these findings will be sent to Congressman Bolton.

JAMES R. GLOYD

James R. Gloyd, 57, construction engineer and builder of the first concrete building in Cleveland, died recently at his residence in Cleveland Heights after a long illness. He graduated from the Case School of Applied Science. He was Vice-President of the Potomac River Corp. and President of the Jefferson Development Company, Charleston, W. Va. He is survived by his wife Anna, a daughter, Anna Frances, and a sister.

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Shots From the Firing Line—*Continued*

The John C. Fisher Company was low with a bid of $224,853 for 1.9 miles of paving on the Lee road, Cuyahoga County.

The contract for straightening and paving Hamm Avenue between Broadway and Dolloff Avenue has been awarded by the Board of Control to **Rieley Brothers Construction Company** of Cleveland on their bid of $29,735.

Michigan Notes

By H. F. UNGER

Michigan should obtain approximately **$23,000,000 for road work** under the highway allocation of the Federal public works fund, it was estimated by Murray D. Van Wagoner, State Highway Commissioner. Of such a sum, $13,000,000 would be alloted for road construction and $10,000,000 for grade separations. The money given to Michigan will probably be used on 389 miles of new construction and 46 miles of widening in the Lower Peninsula, and 208 miles of new construction in the Upper Peninsula.

After four months' effort during which **50,000 yards of dirt** have been dumped into it, a sink hole in the Scotts-Taylor Road in Kalamazoo has been filled up and the road made firm once again. The road section dropped as much as ten feet in a single day.

Voters have approved a **$39,000 bond issue** for a sewage plant in Fremont by a vote of 629 to 144. It is expected contracts will be awarded soon.

Nearly $100,000 in Federal money has been placed to the credit of the city of Jackson in the form of a Federal works credit memorandum to be used to start work on the proposed **$850,000 sewage disposal plant.** Contracts will soon be awarded.

St. Louis and Vicinity

By A. J. KOENIG

The city council of East St. Louis, Illinois awarded a paving contract on Fifteenth Street and Lincoln Avenue to the **Concord Construction Company** for $54,830. Two lower bids were thrown out because they did not meet specifications.

Engineering Construction Company of New York submitted low bid of $4,865,717, April 1 for the construction of dam No. 26 at Alton, Illinois. The bid was approximately 15 per cent higher than the government estimate.

The Forcum-James Company, Dyersburg, Tennessee, was awarded contract by the U. S. Bureau of Biological Survey for construction on a migratory water-fowl refuge at Lake Isom, Missouri. Contracts were also awarded to **Chernus Construction Company** at Chautauqua Bottoms, Ill. and to the **C. J. List Construction Company** at Squaw Creek, Mo.

Hardwick & Horton, Memphis, Tenn. was awarded contract for 585,000 yds. of earthwork in Mauvaisterre Drainage and Levee District, Village of Naples, Illinois.

JOHN G. HENDRICKS

John G. Hendricks, supervisor of right-of-way maintenance for the Big Four Railroad from St. Louis to Pana, Ill. died suddenly Friday, March 29. Mr. Hendricks was connected with the Big Four Railroad for the past 50 years and had a host of friends among the contractors.

River Notes

New Orleans District

Canal Construction Company, Memphis, Tennessee, was low March 28 with a bid of 12c per yard for the construction of 904,000 yards of earthwork in the Lafourche-Pontchartrain Levee District.

Bids for the construction of **1,250,000 yards of levee** will be received May 7. The work is located in Iberville Parish, Louisiana, approximately eleven miles southwest of Plaquemine, and must be completed by March 31, 1937.

Louisiana Notes

Keliher Construction Company, Dallas, Texas, was low with a bid of $73,552, April 3 for the construction of bridges and approaches in Orleans Parish.

The State Highway Commission will **receive bids May 8** for the construction of 10.496 miles of road, including grading, gravel and shell surface, in De Soto Parish, and .604 miles of concrete pavement in Plaquemines Parish.

By L. GABEL

Awards for the construction of 10 Federal Aid Road projects were announced by the Louisiana Highway Commission as follows: **M. L. Hoffman, Jr.,** Madisonville, $92,321, for 5.378 miles grading and surfacing on Versailles-Chef Menteur highway in St. Bernard and Orleans Parishes; **Flenniken Construction Company,** Shreveport, $32,893, for 2.014 miles asphaltic surface treatment on Bernice-Claiborne Parish line highway, Union Parish, and $39,860, for 2.5 miles of surfacing in Bienville Parish; **J. G. Marston,** $48,254 for 1.631 miles concrete paving in Athens, Claiborne Parish; **Kivett and Reel, Inc.,** Sun, $39,846, for 2.578 miles asphaltic surface treatment in St. Tammany Parish; **Delony and Tatum,** Dubach, $29,611, for .846 mile concrete pavement in West Carroll Parish; **T. L. James and Company, Inc.,** Ruston, $38,346, for 1.456 miles concrete pavement in Oberlin, Allen Parish; **Robinson and Young,** Baton Rouge, $84,188, for drainage structures on Tangipahoa-Mississippi state line highway, Tangipahoa Parish, and $121,896, for approaches and overpass over Missouri-Pacific railroad at Sicard, Ouachita Parish; and **List and Weatherly Construction Co.,** Kansas City, $95,414 for approaches and overpass over Southern Pacific railroad at Morgan City, St. Mary Parish.

Additional awards announced later by the Commission include: **Central Construction Company,** Monroe, $17,672, for approaches to Willow Glen overpass in Rapids Parish, $39,757, for 1 mile of concrete north from Crowley in Acadia Parish, $57,887, for 1.78 miles concrete in Ouachita Parish; **Sullivan, Long and Hagerty,** Bessemer, Ala., $183,824, for east approaches to Ouachita River bridge in Ouachita Parish; **W. R. Aldrich and Company,** Baton Rouge, $122,579, for 4.99 miles concrete in Pointe Coupee Parish; **Forcum-James Company,** Dyersburg, Tenn, $59,130, for 2.045 miles concrete in De Soto Parish; **T. L. James and Company, Inc.,** Ruston, $87,697, for bridge over Palmetto-Courtableau Borrow Pit in St. Landry Parish; **Vincennes Steel Corporation,** Vincennes, Ind., $226,618, for approaches and bridge over Bogue Chitto River on Franklinton-Amite Highway in Washington Parish; **Delony and Tatum,** Dubach, $145,252, for 4.428 miles concrete paving in Winn Parish; **A. C. Campbell Construction Company,** Shreveport, $105,581, for 5.027 miles concrete between Latanier and Alexandria in Rapides Parish; and **Huth Construction Company, Inc.,** Franklin, $62,914, for construction of approaches to bridge over Red River in Rapides Parish.

Oklahoma Notes

Operator Charles Yohe sent us this snapshot of himself and the Bucyrus-Erie 1035 shovel he runs for **Park Ward Contracting Company** near Snyder. Mr. Yohe writes he is loading gravel to trucks and that this old machine still has lots of pep.

Texas Notes

The following awards were made by the State Highway Commission: **Austin Road Co.,** Dallas, $313,299, for 12.3 miles concrete pavement in Gregg County; **Jensen Construction Co. Inc.,**

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Shots From the Firing Line—*Continued*

Austin, $100,285, for the Guadalupe River Bridge structure in Kerr County; **Heldenfels Bros.**, Rockport, $29,432, for 5.8 miles grading and draining in Matagorda County and $60,571 for 10.8 miles grading and draining in Jackson County.

Colorado Notes

By H. M. BIBAUD

Driscoll Construction Company completed the construction of the new 15-mile highway from Pueblo west to Fremont County March 30. The new road will be oiled before it is opened to traffic. The road is north of the present Canon City highway and runs its entire distance in almost a straight line, eliminating curves, dips and arroyo crossings. The junction of the new road and the Pueblo-Colorado Springs highway is to be landscaped by FERA workers.

The Caddoa Dam Conservation District Act, providing for organization of a district to seek PWA funds for the construction of a dam across the Arkansas River near Lamar, has been approved by Governor Johnson.

A meeting of the Pine River Water Users Association was held at Ignacio recently at which it was moved that legal measures be taken to incorporate at once. Plans have been advanced for the construction of a dam, to cost $2,200,000, which would impound 100,000 acre feet of water. The flood waters have to be filed upon soon in order to prevent turning these over to Boulder Dam. Two years time remain yet for action.

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Fort Peck Dam Notes

During the week of April 2-9, **Massman Construction Company** averaged over 36,000 yards of dirt per day on the spillway excavation. Operations are carried on in 3 seven-hour shifts per day instead of 4 five-hour shifts which were formerly worked. This change was made to enable workmen to put in their 40 hours a week allowed and this they can do under normal conditions. The contractor is using eleven power shovels and approximately 90 trucks. With an average haul to the dump of about 1½ miles, the contractor moved 216,273 yards in six days' time.

Martin Wunderlich moved 75,266 yards during the same week with only four 1½-yard shovels in operation.

Dredging operations will not start until the ice is out of the river. With the advent of warmer weather, the work is expected to get under way soon.

Mason-Walsh Company, contractors on the diversion tunnel, holed through two more of the pilot tunnels during the week of April 2-9. This leaves only one more, No. 4, the longest, to be completed with only 308 feet to go. The work of concreting at the outlet portals of the four tunnels is progressing rapidly.

Grand Coulee Dam Notes

By GRACE KIRKPATRICK

The world's largest coffer-dam has been completed! In a race with the spring floods on the Columbia River, **Mason-Walsh-Atkinson-Kier Company** have won out by completing a 3,000-foot coffer-dam on the west side of the river, and the work of excavating for the west abutment of the dam and power house may proceed without danger of being engulfed in a flood. Shown above are two views taken from within the coffer-dam. The top view shows the pile-driving activities and the long conveyor which brings in the fill for the coffer-dam cells. The lower illustration is a close-up of the shuttle conveyor which filled the cells at the rate of about 10,000 yards a day. Approximately 275,000 yards of material were used here.

Nevada Notes

By H. L. LIVINGSTON

The following contracts have been awarded by the Highway Commission:

George French, Jr., Stockton, California, $133,924 for 16.21 miles grading and surfacing in Lincoln County; **Union Paving Co.**, San Francisco, $79,324 for 10.18 miles grading and surfacing in Clark County; **Frederickson & Watson**, Oakland, and **Jones & King**, Hayward, California, $160,129 for 9.45 miles grading and surfacing in Lyon County; **Dodge Construction Co., Inc.**, Fallon, Nevada, $97,930 for 20.86 miles grading and surfacing in Esmeralda and Mineral Counties.

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Norris Dam, a T.V.A. Project, where "HERCULES" (Red Strand) Wire Rope is doing its part.

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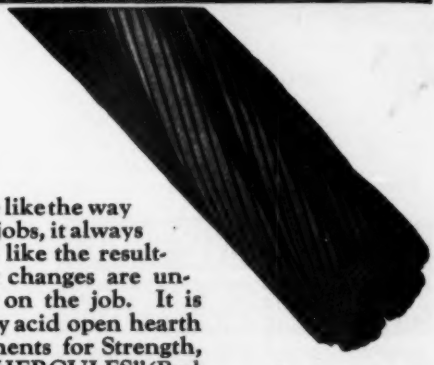

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J. A. Terteling & Son, Boise, Idaho, are moving their Bucyrus-Erie 43-B and E-2 machines to the Rye Patch Dam at Lovelock, and this work will shortly be under way.

New Mexico Notes

Grant County Road Department makes good use of their Bucyrus-Erie 10-B shovel shown above. At the time this picture was taken the shovel was digging fill material for road improvement near Silver City.

California Notes

By H. L. LIVINGSTON

The following contracts have been awarded by the Division of Highways:

E. B. Bishop, Orland, $63,822 for 8.7 miles surfacing in Del Norte County; **A. S. Vinnell,** Los Angeles, $27,729 for 1.7 miles grading and surfacing in Ventura County; **Hemstreet & Bell,** Marysville, $16,730 for 1 mile grading and graveling in Tehama County; **Pacific States Construction Co.,** San Francisco, $19,745 for 0.7 mile grading and graveling in Ventura County; **Sharp & Fellows Contracting Co.,** Los Angeles, $190,723 for 0.2 mile grading and concrete paving in Los Angeles County; **Dimitt & Taylor,** Los Angeles, $34,892 for 1.7 miles grading and surfacing in San Diego County.

The California State Legislature has asked PWA for $50,000 with which to conduct a survey of the Salinas Valley Conservation Project for obtaining water and power from the Salinas River. This project will include a number of dams and power plants at an estimated cost of $10,000,000.

L. E. Dixon, Bent Bros., and Johnson, Inc., Los Angeles, were low bidders in the amount of $366,607 for constructing a vehicular tunnel in Figuerora Street, Los Angeles.

Morrison-Knudsen Company, Boise, Idaho, are preparing to move into the Yosemite Valley, California, to start work on their road contract there which was recently awarded them by the Bureau of Public Roads.

Macco Construction Company is now engaged in placing rock on the crest of San Gabriel Canyon Dam No. 2, under terms of a $124,175 contract. The company is also filling in spots on the upstream side which depressed in the settlement of the dam.

The first piece of construction on the highway that will link Mexico City and California is to be started sometime this year, according to Jose Rivera, secretary-general of the Mexican Automobile Association. Actually, a road now exists that is passable in good weather except for an eight-mile section, but this present road cannot be considered as a "highway", being unimproved for much of the way. The new project, first of a program expected to require several years to complete, will link Mexico City and Guadelajara.

Colorado River Aqueduct Notes

By KAY CAMPBELL

L. E. Dixon, Bent Bros. and Johnson, are making good progress on the 12,-140-foot Pasadena supply tunnel, under the direction of Superintendent H. J. King. So far only soft ground has been encountered. Over a period of 27 days they have advanced 1,020 feet. Steel ribs and timber lagging are used for lining the tunnel. The mucking is done with a Conway machine, which loads to 5½-yard cars designed especially for

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Shots From the Firing Line— *Continued*

this job by Superintendent King. The cars are built to run on a two-foot gauge track instead of the usual three-foot gauge. The muck from the tunnel is being used as a foundation for a new golf course which the city of Pasadena is constructing in the Arroyo Seco.

The West Construction Company, having completed operations at Whitewater tunnel, has moved in on the Monrovia tunnels and has 150 men working in two shifts on two headings. The driving on this job is in rock. Heavy blasting is not permitted because of the several tuberculosis sanatoria located in the neighborhood.

Parker Dam Notes

By K. CAMPBELL

Six Companies are making excellent progress on preliminary work in connection with the construction of Parker Dam. Excavation for the outlet channel, down stream from the diversion tunnels on the Arizona side of the river, has reached a point where preparations are being made for opening the tunnel portals. Work on the California side of the river consists of building a road to the dam. Considerable rock has been encountered. An interesting sidelight on this road construction work is that the shovel doing the pioneering work is the same machine which, in 1931 broke ground at Boulder Dam, 150 miles up-stream. The machine is shown above making a

cut right next to the river. The operators have appropriately named it "Old Faithful."

All-American Canal Notes

By K. CAMPBELL

The Bureau of Reclamation received bids at Yuma April 25, on an additional twenty-three miles of canal excavation. The work, laid out in three schedules, begins at the point where the Callahan contract ends and goes west towards Calexico (this issue had gone to press before the results of the bidding were announced).

The Griffith Company, who is excavating approximately 525,000 yards of rock in the Pilot Knob District, has moved more than half of that amount up to April 15.

Shown below is **Boyce and Igo's** Bucyrus-Monighan 10-W Diesel dragline at work on their section of the canal. Boyce and Igo have subcontracted approximately 6,000,000 yards from the W. E. Callahan Construction Company, whose contract with the Bureau of Reclamation calls for the removing of approximately 40,000,000 yards of dirt over a distance of thirty-two miles. These two contractors have moved about 3,000,000 yards to April 15.

Several sections of the canal project still remain to be placed under contract. This includes the five-mile stretch between Laguna and Imperial Dam. It is expected that bids for the construction of the Imperial Dam will be taken sometime this summer. The dam will be of rock fill construction covered by a concrete slab. The crest of the dam will be 1770 feet long. Six desilting basins will form an integral part of the dam, each capable of passing 9,000 second feet of water without interruption to canal diversion and desilting operations. Each basin will be 1200 feet long and 110 feet wide at the bottom. At the lower end of each basin there will be a double set of gates, the upper gates leading to a flume connecting to the canal, and the lower ones leading to the river below the dam through which the silt from the basin will be sluiced.

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DIETZ LANTERNS

85 Yards an Hour—1400-Foot Round Trip

Hauling in wet clay and gravel on Porter DeWitt's highway job near St. Louis, Missouri, the LeTourneau 12-Yard Carryall Scraper pictured here placed 25,550 cubic yards in 300 scraper hours on a 1400-foot round trip. That's 85 cubic yards an hour.

Such record yardage shortens job time, cuts costs, ups profits. LeTourneau Equipment is moving big yardages like that day after day on jobs from Bonneville Dam to Rhode Island Airport.

Ask our Engineers what Le Tourneau Equipment can do for you. Tell us what your dirt-moving problems are and our Engineers will advise you as to the LeTourneau Units best suited to handle your work profitably. Write for information and Data Sheet proof.

LeTOURNEAU EQUIPMENT

Moves More Yards —JOBS PROVE IT.

A PAYLOAD and NO FOOLIN'!

R. G. LeTourneau, Inc.

Peoria, Illinois Stockton, California

Cable Address: "BOBLETORNO"

Manufacturers of: Angledozers Bulldozers Buggies
Carryall Scrapers Derricks Rooters
Sheep's Foot Rollers Power Control Units

Good Progress Made at Bonneville

(Continued from page 229)

● *Diesel-powered equipment is used quite extensively by Columbia Construction Company. Here on Bradford Island, a Bucyrus-Erie 43-B Diesel shovel loads to a 30-yard Le Tourneau buggy, pulled by a Caterpillar Diesel 75.*

feet long, including the reservoirs. The actual contour of the river bed, as determined from thousands of soundings, has been built into the model. All major obstructions are shown there to scale. Water is passed into the model through weirs and can be controlled for all stages from low water to highest water records. The powerhouse is put into scale, also the coffer-dams, and the action of the water studied under all conditions by actual demonstration. The burrowing effect of the water at the spillway dam was studied in a supplementary model built to a 1 to 30 scale. A method of baffling has been designed which reduces the burrowing to a minimum.

The model studies, which most directly affected the construction work, were in connection with the coffer-dams. It was ascertained in advance what the scour would be into the coffer-dams during submersion in time of high water. Studies of the stability of various types of construction for coffer-dams, resulted in the selection of the one now in use. As a result, the U. S. Engineers designed the coffer-dams in their entirety and wrote the specifications, assuming all responsibility for design. It was then left for the contractor to merely follow these instructions. The results in actual work have very closely approximated the findings of the laboratory.

The Bonneville Dam project comes under the jurisdiction of the U. S. Engineers. Captain Gorlinski is Resident Engineer in charge of the project. B. E. Torpen is Senior Engineer on construction. O. C. Hartman is Engineer in charge of the main dam project. H. M. Rigler is Engineer in charge of power house and locks. Lieutenant Myers is Executive Officer, and G. E. Goodwin is Senior Engineer.

● *A Plymouth locomotive hauls the 6-yard concrete car from the mixing plant to the loading platform where the concrete is transferred to the cableways.*

● *Top: The Bucyrus-Erie 75-B working as a dragline, excavates the river bed for coffer-dam fill. Below: Here is the same machine with a shovel attachment, loading to White trucks.*

REX SPEED PRIME PUMPS
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A Complete range of Sizes - 2" to 8" - Sized and powered for every pumping job

THE MOST FOOT GALLONS PER HOUR
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ON CONSTRUCTION OR MAINTENANCE WORK

Whatever the job may be — building bridges and structures, fabricating tanks and culverts, or keeping equipment in repair — the P&H-Hansen Arc Welder can soon pay for itself.

P&H-Hansen gives you arc welding at its best because it's simpler to operate. There's only one dial adjustment for the entire welding range. And its uniform current means welds of more uniform strength.

The P&H-Hansen gasoline driven portable model can "get around" wherever you want it — *when* you want it. Ask for full particulars.

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BACKED BY 50 YEARS OF EXPERIENCE

● *This Bucyrus-Erie model 100-B Electric Dragline is operating on the Colorado River Aqueduct of the Metropolitan Water District of Southern California.* Powered by Westinghouse.

PROMPT SERVICE
ANYWHERE

— for Shovels with
Electric Drive —

Whether your shovels are at work in Pennsylvania's anthracite fields or in the copper mines of Colorado . . . they are always within over-night distance of *Westinghouse Service.*

Westinghouse service shops, 36 in all, are strategically located throughout the country. Manned with factory-trained experts and equipped for speedy, efficient work, they are ready day or night to make repairs when you need them most.

Remember, when you buy *Westinghouse* electric shovel drive, you not only get equipment that is built for tough jobs . . . you also know that expert service is never more than a few hours away.

Service from Coast to Coast

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ELECTRIC SHOVEL DRIVES

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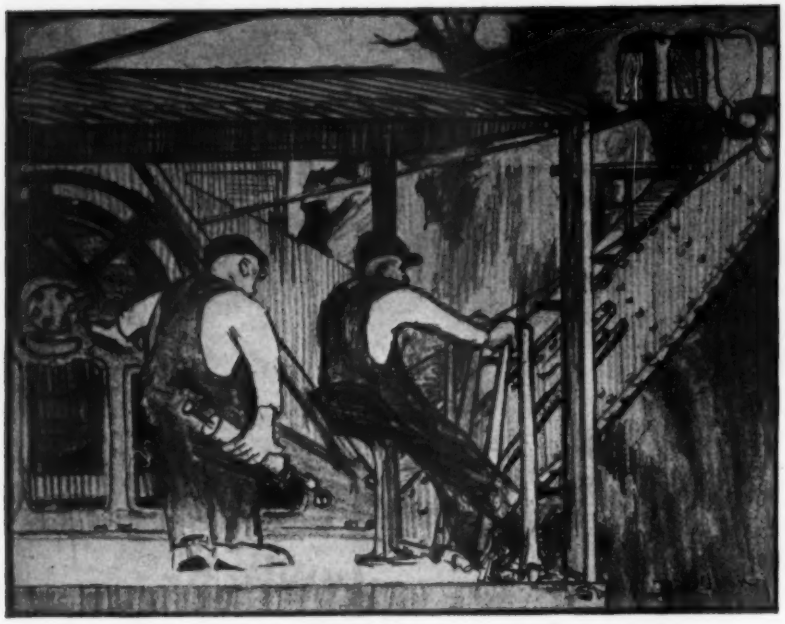


"Once more, Charley, I warn you them ain't no CWA bites you're takin'."

"Is my face dirty or is it my imagination?"

"Your face is clean, I can't tell about your imagination."

Operator (absent-mindedly): "You're a dear, sweet girl, Anna."

Operator's Girl: "Why, my name is Sue!"

Operator (recovering): "I say you're a dear, sweet girl, anna love you with all my heart."

"Can I touch you for five dollars?"

"For five dollars you can sock me on the jaw!"

Wise: "I've just given my wife a sable coat."

Crack: "To keep her warm?"

Wise: "No to keep her quiet."

First Successful Contractor: "Have any of your childhood hopes been realized?"

Second Successful Contractor: "One. When my mother combed my hair I used to wish I didn't have any."

Timid Wife (to husband who has fallen asleep at the wheel): "I don't mean to dictate to you George, but isn't that billboard coming at us awfully fast?"

A darky running a ferry across the Alabama River was accosted by a poor white stranger who wanted to cross, but hadn't the wherewithal.

Pete scratched his woolly poll, perplexedly, then queried: "Doan' yo' got no money at all?"

"No," was the dejected reply.

"But it doan' cost you' but three cents ter cross," insisted Pete.

"I know, but I hain't got three cents."

After a final inward think, Pete remarked: "I done tell yo' what; a man what's not got three cents am jes as well off on dis side ob de ribber as on de odder!"

"Hello, sweetheart." said a masculine voice over the telephone. "This is Gideon."

"This is a terrible connection," answered the treble voice, "Who did you say it was?"

"Gideon! GIDEON."

"What?"

"Gideon. G for gin; I for ice; D for drink; E for excess; O for orey-eyed; and N for necking. Get it?"

"Well, not all of it, but anyhow, come right up."

"I'm crazy about your wife, MacTavish, and if you'll let me have her I'll pay you her weight in gold."

"Let me have a few days first."

"To think it over?"

"No, to fatten her up!"

She: "John, dear, I wouldn't let anyone else kiss me like this."

He: "My name isn't John."

A temperance lecturer was concluding his address. "Friends," he said, "I have lived here all my life. In this town there are fifty taverns, and I am proud to say I have never been in one of them."

From the back of the hall came the question, "And which one is that?"

"You say she is only a photographer's daughter?"

"Yes, she sat in a dark room and awaited developments."

A traveler was questioning Rastus about his home town.

"How many people live in this town?" he wanted to know.

" 'bout four thousand people, suh. It's been that way for forty years."

"You mean to tell me that there were four thousand people here forty years ago, and only four thousand now? Haven't any people moved in—any babies been born here?"

"Yes, suh, babies been born, but eve'y time a baby is born somebody leaves town."

The deceased dirt-mover knocked at the gates of hell and demanded admittance. "What do you want here?" asked Satan. "I want to collect from several of my customers who died before I did," was his response. "How do you know that they're here?" asked Satan. "Well, they told me to come here, every time I tried to collect."

For Tough Digging and Rough Going

CRESCENT
Hydraulic Scraper

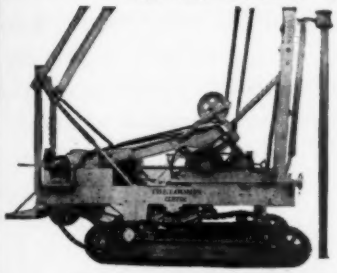
NOW you can own a tractor-operated scraper that is a real excavator. It is built along the same lines as the famous cable-operated Sauerman Scrapers used by thousands of contractors. It has the power to tackle the toughest digging, while its ease of handling and large carrying capacity assure dirt moving costs of a few cents per yard.

SAUERMAN BROS.
474 S. Clinton St.
CHICAGO

Write for Bulletin 141

No Obstacle Too Tough!

The New LOOMIS "CLIPPER" DRILLS—



Meet all conditions
Are sturdily built
Drill faster
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Satisfied users in all parts of the world.

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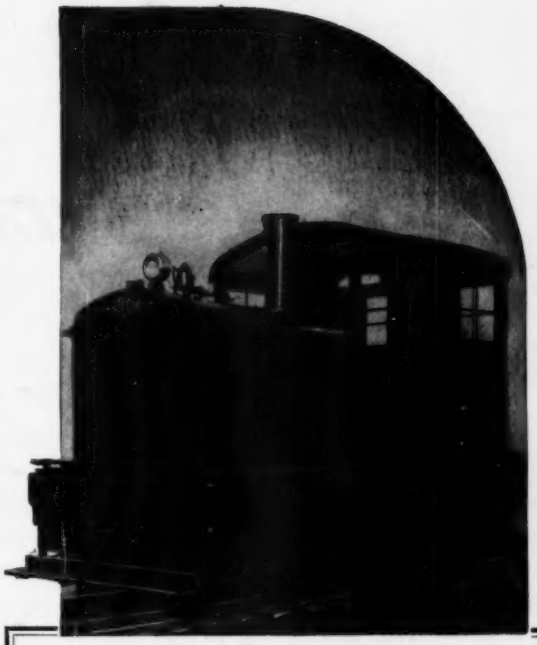

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1—3½ ton, 24" gage, new gasoline-mechanical locomotive in San Francisco.

1—4 ton, 42" gage, 250 volt D.C. trolley locomotive at Rochelle, Ill.

1—6 ton, 24" gage, rebuilt gasoline-mechanical locomotive at Rochelle, Ill.

1—8 ton, 36" gage, rebuilt gasoline-mechanical locomotive at Rochelle, Ill.

1—12 ton, 36" gage, new gasoline-mechanical locomotive at Rochelle, Ill.

1—12 ton, 36" gage, new gasoline-mechanical locomotive in San Francisco.

1—12 ton, 56½" demonstrator gasoline-mechanical locomotive in Ocean City, Md.

1—13 ton, 36" gage, rebuilt gasoline-mechanical locomotive at Rochelle, Ill.

1—40 ton, 56½" gage, demonstrator gasoline-electric locomotive in Philadelphia, Pa.

All of the above locomotives are offered by the original manufacturer.

Backed by new locomotive guarantees.

Prices on request, subject to prior sale.

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Subsidiary of The Baldwin Locomotive Works
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EXCAVATING ENGINEER Bargain Counter

★ ★ ★ **THE ITEMS LISTED on these pages have been selected because they offer unusual values to the man who is looking for a bargain. Some of this equipment is surplus stock which has never been used, some is rebuilt and carries new equipment guarantee, some is just plain used. But every item is priced for quick sale. If any of this equipment fits your needs send a postcard or letter, mentioning the reference number, to *Bargain Counter, Excavating Engineer, South Milwaukee, Wisconsin.* We'll pass your inquiry along to the owner and you will receive price and complete information promptly. Act now — with advancing prices on new stock this equipment will move fast.**

COMPLETE FRONT END EQUIPMENT

Shovel Equipment

¾ CU. YD. DIPPER—20' boom—13' Dipper Handle—rope crowd shovel equipment. Suitable for models 1030 or 1035—brand new. SE-1.

¾ YARD PLATE DIPPER, 19'9" BOOM, 18'4" DIPPER HANDLE—Shovel equipment suitable application Bucyrus-Erie B or B-2. Good condition. SE-29.

¾ CU. YD. DIPPER—23' BOOM and ENGINE —12'6" DIPPER HANDLE—Shovel Equipment suitable for 20-B Steam. Brand New. SE-15.

¾ CU. YD. DIPPER—26' BOOM and ENGINE —17' DIPPER HANDLE—High Lift Shovel Equipment suitable for 30-B Steam. Brand New. SE-16.

¾ CU. YD. DIPPER—25'9" BOOM—14' DIPPER HANDLE—Shovel Equipment suitable for 30-B Diesel. Brand New. SE-17.

⅞ CU. YD. DIPPER—21'9" BOOM and ENGINE—15' DIPPER HANDLE — High Lift Shovel Equipment. Suitable for 31-B Steam. Brand New. SE-18.

1 CU. YD. DIPPER—20' BOOM—15' DIPPER HANDLE — Rope Crowd Shovel Equipment, suitable for Osgood "Conqueror." Good mechanical condition. Low Price. SE-24.

1 CU. YD. DIPPER—23' BOOM—12'6" Dipper Handle—Rope crowd shovel equipment. Suitable for D-2 machine. Brand new. SE-4

1 CU. YD. DIPPER—24' BOOM—18' DIPPER HANDLE—Slightly used but good conditioned. Suitable for any Bucyrus-Erie GA-2 or GA-3 Machine. SE-25.

1 CU. YD. DIPPER—24' BOOM—16' DIPPER HANDLE—Rebuilt and Guaranteed. Suitable for application Bucyrus-Erie GA2 or GA3 Machines. SE-26.

1¼ CU. YD. DIPPER—22'6" BOOM—16' DIPPER HANDLE—Rebuilt and Guaranteed. Suitable for application Bucyrus-Erie GA2 or GA3 Machines. SE-27.

1½ CU. YD. DIPPER—25' BOOM—17' DIPPER HANDLE—Slightly Used Rope Crowd High Lift Shovel Equipment suitable for Model 37-B. New Machine Guarantee. SE-5

1½ CU. YD. DIPPER—27' BOOM—17' DIPPER HANDLE—High Lift Rope Crowd Shovel Equipment suitable only for Bucyrus-Erie 43-B machines. Rebuilt—New Machine Guarantee. SE-23.

Dragline Equipment

35' CHANNEL BOOM, FAIRLEAD AND ROPES, but not including bucket. For use on Model D-2. DL-2.

40' CHANNEL BOOM, FAIRLEAD AND ROPES, but not including bucket. For use on Model D-2. DL-3.

40' CHANNEL BOOM, FAIRLEAD AND ROPES, but not including bucket. For Model E-2. Brand New. DL-6.

45' CHANNEL BOOM, FAIRLEAD AND ROPES, but not including bucket. For Model E-2. Brand New. DL-7.

40' CHANNEL BOOM, FAIRLEAD AND ROPES, but not including bucket. For use on 30-B Diesel. Brand New. DL-8.

45' CHANNEL BOOM, FAIRLEAD AND ROPES, but not including bucket. For Model 30-B Diesel. Brand New. DL-9.

BRAND NEW Ropes included with each of above Dragline Equipments.

All of above equipment is BRAND NEW and of BUCYRUS-ERIE manufacture.

Skimmer Scoop

⅝ CU. YD. DIPPER—20' Boom together with all necessary ropes and material to completely convert Bucyrus-Erie 1020 Shovel, Clamshell or Dragline to Skimmer Scoop Machine. Brand New. Shipment 2 to 3 weeks. SS-1.

Trench Digging Equipment

1 CU. YD. 42½" WIDE—Solid type Dipper—24' Boom and all auxiliary equipment. Will dig maximum depth 22'. For application to GA-2 or GA-3 Shovel. Rebuilt—New Machine Guarantee. DS-4.

BRAND NEW PAGE, two dippers each ¾ cu. yd., one 38" wide over cutters, the other 49½" wide over cutters. 17'1½" Boom and all necessary auxiliary equipment. Will fit Bucyrus-Erie 1030 or 1035. DS-7.

1-CU. YD 42½" WIDE SOLID TYPE DIPPER—24' Boom and all auxiliary equipment—will dig maximum depth of 22'—For application to GA-2 or GA-3 Clam Shell or Drag Line. Rebuilt—New Machine Guarantee. DS-8

BRAND NEW Ropes included with each of above Trench Digging Equipments.

SHOVELS-CRANES DRAGLINES

P&H MODEL 208—45' BOOM DRAGLINE—4-cylinder 7¾"x9" Twin City gasoline engine and 1½ cu. yd. Omaha bucket. SCD-29.

MEAD-MORRISON GASOLINE COMBINATION SHOVEL-CLAMSHELL. ½ cu. yd. Dipper, 17' Dipper handle—18' Boom—32' Clamshell Boom and ½ yard Erie Clamshell Bucket. 5"x6" 4-cyl. Wisconsin Engine. Good mechanical condition. Bargain Price. SCD-33.

BAY CITY "PUP" GASOLINE CLAMSHELL. Good mechanical condition. SCD-34.

BYERS "BEARCAT" Gasoline ⅝-yard Shovel. Hercules engine. Overhaul. Good mechanical condition. SCD-35.

THEW-UNIVERSAL MODEL 35 — Gasoline — ½ cubic yard standard shovel equipment—35' lattice type crane boom and ½ yard Williams bucket with teeth—complete drag shovel attachment and skimmer scoop bucket, including home-made trailer. Excellent condition. SCD-36.

BUCYRUS-ERIE MODEL 30-B DIESEL SHOVEL—25'9" Boom, 14' Dipper Handle, 1 yd. Dipper. SCD-6.

DIPPERS

Small Machines

1 ⅜ CU. YD.—Plate.—Will fit 20-B Steam or Gas. Brand New. D-12.

1 2/3 CU. YD.—Plate front.—Will fit 14-B. Brand New. D-13.

1 ½ CU. YD.—Rock Type.—Will fit 20-B Steam or Gas. Brand New. D-15.

1 ⅝ CU. YD.—Plate front.—Will fit 1030 or 1035. Brand New. D-16.

1 ⅝ CU. YD.—Plate front.—Will fit 1030 or 1035. Brand New. D-18.

1 ⅝ CU. YD. CAST FRONT INSERTED TOOTH DIPPER. Will fit 1030 or 1035. Slightly used. D-36.

1 ⅝ CU. YD. CAST FRONT INSERTED TOOTH DIPPER. Will fit 1030 or 1035. Brand New. D-37.

1 ¾ CU. YD.—Plate front.—Will fit 18-B. Brand New. D-20

1 ¾ CU. YD.—Rock type. Will fit 31-B. Brand New. D-21

1 CUBIC YARD MANGANESE DIPPER. Will fit Bucyrus-Erie B-2 or GA-2. Good condition. D-40

1 1 CU. YD.—Cast Front Inserted Tooth Dippers. Rebuilt and Guaranteed. Suitable for application GA2 or GA3 Machines. D-34.

1 1¼ CU. YD.—VAN PORT—ROCK TYPE. Will fit E-2, 41-B or 42-B. Slightly Used. D-26.

2 1¼ CU. YD.—VAN PORT—ROCK TYPE. Will fit E-2. Brand New. D-27

1 1¼ CU. YD. CAST FRONT INSERTED TOOTH DIPPER. Will fit 37-B. Slightly used. D-38.

1 1½ CU. YD.—PLATE. Will fit E-2. Brand New. D-28.

1 1½ CU. YD. CAST FRONT INSERTED TOOTH DIPPER. Will fit 43-B. Slightly used. D-39.

2 1½ CU. YD.—Manganese Front Inserted Teeth. Will fit E-2, 41-B or 42-B. Slightly used. D-29.

1 1½ CU. YD.—Vanderhoef type with Vanderhoef teeth. Will fit E-2 or 42-B. Slightly Used. D-30.

Large Machines

1 2½ CU. YD.—Front 2½" Molybdenum Cast Steel, two part Van Port Reversible Teeth. Can be used on 68-C and 70-C machines. Brand New. D-1.

2 3 CU. YD.—Front 2½" Molybdenum Cast Steel, two part Van Port Reversible Teeth. Can be used on Model 100-B, 68-C, 70-C Machines. Brand New. D-2.

1 3½ CU. YD.—Front 2¾" Nickel Chrome Steel, two part Van Port Reversible Teeth. Can be used on Model 88-C, 95-C, Class 180. Brand New. D-3.

1 4 CU. YD.—Front 2¾" Molybdenum Cast Steel, two part Van Port Reversible Teeth. Has seen some service but in good condition. Can be used on Model 100-C, 120-B. D-4.

1 4½ CU. YD.—Lip 2¼" Manganese Steel, two part Reversible Manganese Teeth. Can be used on Model 88-C, 110-C. Brand New. D-5.

1 6 CU. YD. Molybdenum Steel Front. Annealed Cast Steel Back, two part Reversible Van Port Teeth. Can be used on 225-B and 320-B. Brand New. D-11.

1 6 CU. YD.—Front Molybdenum Steel, two part Van Port Reversible Teeth. Can be used on Model 220-B. Slightly Used but excellent condition. D-6.

DRAGLINE BUCKETS

BRAND NEW

1 ¾ CU. YD. PAGE CLASS "C". Approximate weight each 2425 lbs. DB-1

1 1¾ CU. YD. BUCYRUS-ERIE TYPE "U". Approximate weight 2900 pounds. DB-15

3 2 CU. YD. PAGE CLASS "C." Approximate weight each 5630 lbs. DB-4.

3 2¼ CU. YD. BUCYRUS-ERIE TYPE "U". Approximate weight 3850 lbs. DB-13.

4 2½ CU. YD. BUCYRUS-ERIE TYPE "U". Approximate weight 4600 lbs. DB-14.

1—5 CUBIC YARD HEAVY DUTY—approximate weight 12000 pounds. Item DB-16

1—6 CUBIC YARD TYPE W MONIGHAN BUCKET—approximate weight 12500 pounds. Item DB-17

1—7 CUBIC YARD TYPE W MONIGHAN BUCKET—approximate weight 13700 pounds. Item DB-18

REBUILT

1 2 CU. YD. BUCYRUS-ERIE TYPE "U". Approximate weight 3200 lbs. DB-12.

1 2½ CU. YD. BUCYRUS-ERIE INSERTED TOOTH. Approximate weight 6500 lbs. DB-9.

1 2½ CU. YD. OMAHA STANDARD. Approximate weight 5400 lbs. DB-10.

USED

1 1 CU. YD. PAGE BUCKET. DB-20.

1—6 CUBIC YARD TYPE W MONIGHAN—approximate weight 12500 pounds. Item DB-19

CLAMSHELL EQUIPMENT

50' BOOM CLAMSHELL EQUIPMENT including front drum and gearing but not including ropes. Practically new condition. Can be applied to Type B or B-2 machines. CS-1.

BOILERS

BRAND NEW

Will Make That Old Shovel Work Like New.
Can also be used for Miscellaneous Service

Vertical Type

3 46½"x110"—40 H.P.—155 lb. Working Pressure. Special Wood Burning Fire Box. ASME Std. Will fit any B-2 or B-3. B-9.

1 54"x100"—41 H.P.—125 lb. Working Pressure. ASME Std. Will fit B-2 or B-3. B-11.

2 42"x88"—35 H.P. 144 lb. working pressure. Mass. Std. Will fit type B. B-17.

Locomotive Type

3 44"x17'—75 H.P.—125 lb. Working Pressure. ASME Std. Will fit Model 68-C. B-13.

1 44"x18'—88 H.P.—125 lb. Working Pressure. ASME Std. Will fit Model 70-C. B-14.

2 54"x11'3"—92 H.P.—125 lb. Working Pressure. ASME and Mass. Std. Will fit Model 50-B Machine. B-16.

2—70"x12'—136 H.P. 175 lb. working pressure. ASME. and Mass. Std. Will fit 120-B. B-18.

ELECTRICAL EQUIPMENT

MOTOR—GENERAL ELECTRIC—3 phase, 25 cycle, 550 volt, 1500 RPM., 90 HP., BRAND NEW. EE-1.

50 KW MOTOR GENERATOR SET—GENERAL ELECTRIC—consisting of 3 phase, 60 cycle, 440 volt, 1170 RPM., 75 HP., Induction Motor connected to 50 KW, 250 volt, 1200 RPM., Generator, including suitable rheostat and compensator. BRAND NEW. EE-2.

COMPENSATOR — GENERAL ELECTRIC—75 H.P., 2220 volt, 3 phase, 25 cycle, manual type. BRAND NEW. EE-3.

TRANSFORMER—GENERAL ELECTRIC—5-KVA. 2200-3810 volt primary, 440-220 volt secondary—3 phase, 60 cycle, with cast iron tank and cover, including specially fastened bushings to prevent oil leakage. BRAND NEW. EE-4.

GENERATOR — WESTINGHOUSE — 125 KW, 250 volts, 500 amperes. Direct Current. 446 RPM. Includes two outboard bearings. BRAND NEW. EE-5.

MOTORS (2) — GENERAL ELECTRIC — 21.5 H.P. 3 phase, 60 cycles, 440 volt, 900 RPM. Totally enclosed—ball bearing. BRAND NEW. EE-6.

AIR COMPRESSORS

1 BRAND NEW WORTHINGTON—METAL-WELD—2-cylinder 7"x6" Vertical 162 cu. ft. piston displacement, Air Compressor. Fitted with Laidlaw feather valves—Lugs on side for mounting on skids or channels—Shaft extended and equipped with semi-flexible coupling to take 2⅝" drive shaft—Force feed lubrication. Automatic control. Includes 1" High capacity centrifugal circulating pump—"V" belt driven—18"x41" Air Receiver, 100 pounds working pressure. A.S.M.E. Standard. Electric or gasoline power required approximately 30 H.P., approximately 1000 R.P.M.—Compressor Speed approximately 550 R.P.M. — Overall dimensions:—Height 45"—Length 37½"—with 28". AC-3.

2 11"x11"x13" STEAM DRIVEN LOCOMOTIVE TYPE, Westinghouse air compressors with fittings. Brand New. AC-1.

1 11"x11"x13" STEAM DRIVEN LOCOMOTIVE TYPE, Westinghouse air compressors with fittings. Used. Make offer. AC-2.

ROAD ROLLERS

1 10-TON BUFFALO SPRINGFIELD GASOLINE ROLLER with scarifier. About three years old. Splendid condition. Very favorable price. RR-1.

ENGINES

Designed especially for application to Excavating or similar Equipment. Can be used for stationary or semi-stationary service.

Diesel

2 BRAND NEW NON-REVERSIBLE ATLAS DIESEL ENGINES—6-cylinder, 9" bore x 10½" stroke, 150 H.P. at 450 R.P.M., 4 cycle, Vertical—valve in head type. Dust proof, Oil tight crank case and forced lubricating system. Also auxiliary air starting equipment. DE-2.

1 BRAND NEW NON-REVERSIBLE ATLAS DIESEL ENGINE—4-cylinder, 6" bore x 8" stroke, 45 H.P. at 650 R.P.M., 4-cycle, Vertical—valve-in-head type. DE-5.

Gasoline

1 MODEL HH-U NOVO—16 H.P. ENGINE—4-cylinder, 3¾" x 4"—1200 R.P.M.—Radiator cooled—complete power plant—mounted on channels—sheet metal housing—extended crank shaft 1⅞" diameter, including outboard bearing with Fafner ball bearing. GE-1.

Steam

1 12½"x16" link reversing type for Railroad Shovel. ME-1.

2 4½"x5" reversible—20.8 H.P. at 400 R.P.M. 100 lb. Pressure. ME-2.

1 4¾"x5" reversible—23.2 H.P. at 400 R.P.M. 100 lb. Pressure. ME-3.

2 5"x5" reversible—25.6 H.P. at 400 R.P.M. 100 lb. Pressure. ME-4.

LOCOMOTIVES

3 24-INCH GAUGE 3-TON BALDWIN GASOLINE LOCOMOTIVES, Model AL, Type 2. Price very favorable. L-1.

TRAILERS

1-14 TON WILLIAMS "ECONOMY" TRAILER. Arch Girder Construction—Safety Chains—Rear Loading ramp. Solid Rubber tired wheels 28"x10" front 28"x16" rear. Deck dimensions 12'x7'9"x31½" high. Brand new. T-1.

PUMPS

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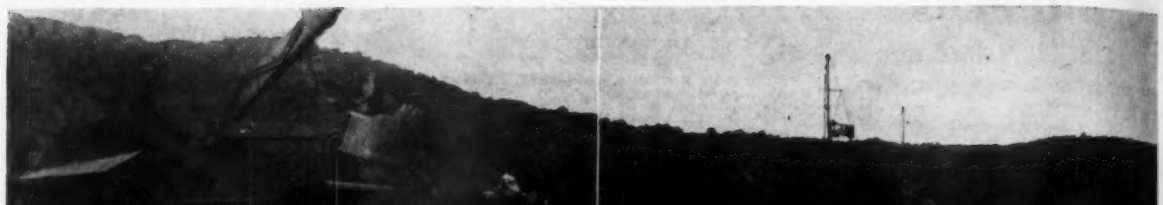

New Breakwater Protects Port Allen Harbor

(Continued from Page 233)

● *Left: The Bucyrus-Erie 50-B Diesel shovel loads rubble to one of the International trucks with its sugar scoop body. Right: A P&H crane sorts out the Class A stone. Two Bucyrus-Armstrong drills sink blast holes on the ledge above.*

ment. The main reliance was placed on two Bucyrus-Erie 50-B machines; one a steam crane and the other a Diesel shovel. These, aided by a Caterpillar Diesel Seventy-five, stood up to the pile and did the bulk of the pulling out, sorting and loading. Smaller machines, a P&H 206 crane, a shovel of the same make and model, and a Bucyrus-Erie Gas+Air 2 shovel were effective after the heavy pulling out and handling of large blocks had been taken care of by the 50-Bs.

About 48 per cent of the rock excavated was waste, either because it had adhering clinker, was too porous, or was of the wrong size or shape to meet specifications. The rock actually placed in the breakwater weighs up to 190 pounds per cubic foot, and is magnificently hard, strong basalt. The sorting operations again proved very expensive in time consumed, so that the actual output for each unit of loading equipment was low. The heavy service was reflected by the loss of time and cost of repairs resulting therefrom. Much of the equipment stood up remarkably well, however, particularly the Bucyrus-Erie steam crane and GA-2 shovel.

Average output was 40 cubic yards per hour for the 2-yard steam shovel, 25 cubic yards per hour for the 1¼-yard Gas+Air shovel, and 21 tons per hour of heavy blocks loaded by the 50-B steam crane. These figures show what a large proportion of the time was consumed in sorting operations.

Rock Hauled in Trucks

The hauling between quarry and breakwater was done by a fleet of six A-8 International trucks; two with heavily timbered flat bodies having five renewable rock sills of 6x6 pine running lengthwise of the body; and four with special, heavily built, steel dump bodies without tail gates. These bodies were built narrow so as to dump easily into the skip, and were of the sugar-scoop type. A new road with heavy, bituminous macadam paving was built the entire distance, and great care was given to maintaining the truck ways on the quarry floor. As a result, the tire service was gratifying. High-pressure tires were used to give greater maneuverability and despite heavy overloading averaged about 5,000 miles per tire.

Wide Trestle Expedites Dumping

The trestle had unusual width, seventy feet. One standard-gauge track was on the center line of the breakwater, a second track forty feet inshore, and a twelve-foot truck runway inshore of this track. Six-pile bents were driven on fourteen-foot centers. The driving was generally quite soft. Sixty-foot piles were the most usual length, although occasionally ninety-foot piles were required. To reduce the settlement

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Territorial Distribution (Based on August 1934 issue)

New England	1200	East South Central	1192	Pacific	1473
Middle Atlantic	4364	West North Central	2417	Canada	1411
South Atlantic	1589	West South Central	1246	Miscellaneous	1505
East North Central	4224	Mountain	1217	Foreign	3551

Trade Distribution (Based on August 1934 issue)

Contractors—general, railroad, highway, drainage, dredging, sewer, excavating, irrigation projects, etc., 8,882; quarries, 1,634; sand and gravel plants, 875; superintendents, foremen, operators, 3,427; highway officials and other state, county and municipal engineers, government officials and engineers, 1,734; brick and clay plants, 602; mining companies (except coal), 741; coal mines (principally strip mines), 412; logging companies, 393; miscellaneous users of excavating machinery, civil engineers and unclassified, 2,345; advertisers, 319; clubs, technical schools, libraries, etc. 535; less correction for names in two or more classifications, 61; foreign (except Canada), 3,551.

I hereby swear that the above circulation figures are true and correct according to my best knowledge and belief.

(Signed) G. WITTE, Circulation Mgr.
E. M. HEUSTON, Advertising Mgr.

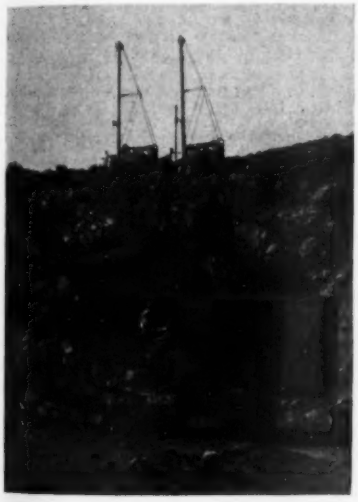
STATE OF WISCONSIN }
COUNTY OF MILWAUKEE }

Personally appeared before me, a Notary Public in and for said County and State, the above mentioned, G. WITTE, and E. M. HEUSTON, to me known to be the Circulation Manager and Advertising Manager, respectively, of the Excavating Engineer Publishing Company, who executed the above instrument in my presence.
Witness my hand and seal this 24th day of April, 1935.
Seal.
(Signed) GEO. H. GONDEAU, Notary Public.

of the structure under the heavy loads, scabbing alternate piles was resorted to freely. The trestle, with its deck fifteen feet above sea level and offering little resistance to waves below, was little affected by the heavy seas sometimes experienced. The driving was done by a No. 2 Union pile hammer supplied with steam from the boiler of the offshore derrick. The trestle carried the compressed air line, water line, electric power line, and steam line to the pile driver.

Two stiff-leg derricks ran on the two standard-gauge tracks, which were forty feet apart. The masts and engines of the derricks were located on the center line track with the heavily ballasted stiff leg outriders on the inshore track. Each derrick was mounted on three heavy, four-wheel trucks.

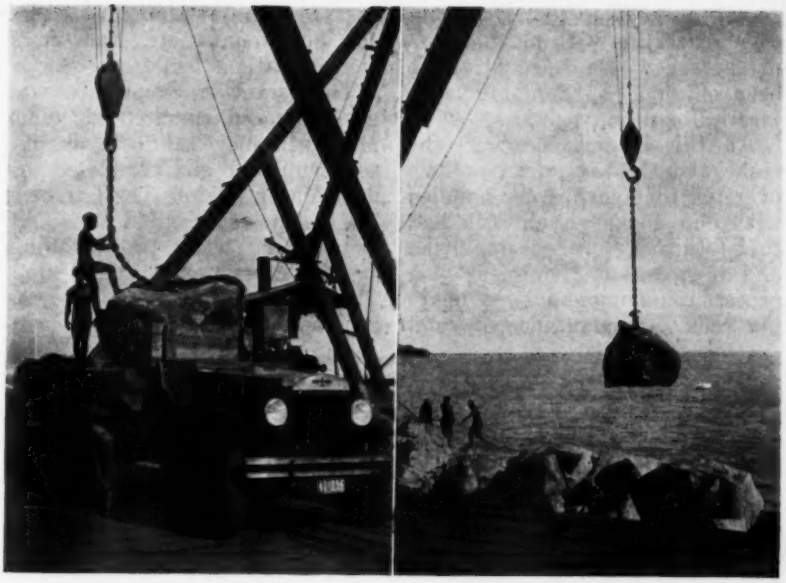
During the bulk of the work, the offshore derrick was engaged in building up the rubble mound to within three or four feet of the water surface, while the inshore derrick completed the work and set the cap and slope stones. As the latter proved to be the slower task, it was necessary to operate both derricks on this phase of the work for about two months near the end of the job.



● *The Bucyrus-Erie GA-2 stood up well in this heavy digging.*

Accurate Cross Sections Obtained with Dumping Scheme

The smaller rock was handled by dump trucks and skips. The skips were constructed with sufficient width to enable a truck to back into it to dump its load. These trucks therefore were not held on the trestle but were enabled to dump and return immediately to the quarry. The entire 10-ton truck load was then placed wherever needed by the skip. Larger rock were lifted directly from the flat bed trucks and placed individually. This method



● *Left: A native laborer adjusts the sling around a cap stone. Right: Another stone is lowered into place.*

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permitted keeping to the designed cross section with much greater accuracy than could have been obtained by dumping from trestles or dump scows.

At the inshore derrick, the rocks, which averaged a little over ten tons each, were handled with dog hooks. Each rock had to be turned, blocked up, fitted and if necessary trimmed — a process requiring about two hours per rock. Abundant use of compressed air, jack-hammer drills, dog hole points, etc., was made at this station.

The Port Allen Breakwater was designed and commenced under Major Stanley L. Scott as district engineer and completed under Major Ralph G. Barrows. These two represented the U. S. Government with Henry Moniz as inspector-in-chief on the job. The Kauai Railway Company, as contractor, employed the Hawaiian Dredging Company to manage the work. The Hawaiian Dredging Company, with large experience and resources in this class of work, was represented mainly by H. P. Benson, its Treasurer. On the job were employed: the writer as Consulting Superintendent, Kirk Miles as Assistant Superintendent, H. Hutchins as Quarry Superintendent, and A. A. Hartman as Breakwater Superintendent.

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COMBINATION SHOVEL-DRAGLINE-CLAMSHELL
Two Northwest Model 3 Combination Shovel—Dragline and Clamshells, without buckets. Shovel equipment 22'6" boom, 15'4" dipper handle, ¾ cubic yard dipper. Equipped with Wisconsin B-2 4-cylinder 5¼"x6½" gasoline engine. Completely overhauled July, 1934. Excellent condition. Box 635-SS

TYPE B STEAM SHOVEL, Cat mounted, 19'6" boom, 14' dipper handle, ¾ cubic yard dipper, also 36' clamshell boom and front drum and gearing. Located Kansas City, Missouri. Box 622-SS

Small Clamshells and Cranes
Under 2 Yards

CRANE—THEW—UNIVERSAL—MODEL 35— 25' boom clamshell—crane including ½ cu. yd. Williams clamshell bucket—center drive cat. Electric starter, 4 cylinder Waukesha 4½"x 6¼" gasoline engine. Also, complete ½ yd. shovel equipment, drag shovel equipment and skimmer scoop equipment together with home-made trailer. Box 468-SCC.

NORTHWEST — MODEL 105 — 45' BOOM CRANE. Cat mounted. 1 yd. capacity. 6¼x8 Twin City gasoline engine. Good operating condition. Located vicinity New York. Box 469-SCC.

BYERS BEARCAT 25' BOOM CLAMSHELL (¾ swing) and ½ cu. yd. Clamshell Bucket, including Trench digging attachment carrying ½ cu. yd. dipper. 24" wide over cutters—will dig maximum 15'. Good operating condition. Very attractively priced. Located vicinity of Wilkes Barre, Pennsylvania. Box 494-SCC.

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BUCYRUS-ERIE 1030 GASOLINE 40' BOOM CLAMSHELL MACHINE. Cat mounted. No Bucket. Recently overhauled. Guaranteed. Located Kansas City. Box 543-SCC.

KOHERING NO. 2 GASOLINE CRANES. 45' booms, 15 tons at 12' radius. Wisconsin engines. Recently overhauled. First class working condition. Located Milwaukee. Box 630-SCC

BARGAIN CRANE
Northwest Crane, Model 104, 40' boom. Manufacturer's No. 146, Twin City Motor. Located in Texas. Box 642-SCC.

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BYERS BEARCAT CLAMSHELL—Crane—30' boom. Will handle ½ cubic yard bucket. Located near Detroit. Box 648-SCC.

O & S MODEL "T" ¾ yard clamshell machine. 40' boom. Good working condition. Powered with Climax 5½"x7" gasoline engine. Located southern Illinois. Good working condition. Box 651-SCC.

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Under 2 Yards

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If You Do Not Find What You Want Listed—Write Us

The Excavating Engineer
South Milwaukee, Wis.

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LINK-BELT COMBINATION DRAGLINE—SHOVEL—CLAMSHELL—1½ cubic yard capacity. 22' shovel boom, 16'6" dipper handle, 1½ cubic yard Esco dipper. 40' clamshell-dragline boom and 1 cubic yard Blaw Knox No. 618 clamshell bucket and 1½ cubic yard Esco drag bucket. Total weight as shovel 84,000 pounds. Powered with Atlas four cylinder 7"x10½" Diesel Engine. Good operating condition. Located Montana. Box 650-SD.

Large Shovels and Draglines
2 Yards and Over

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If You Do Not Find What You Want Listed—Write Us

Excavating Engineer
South Milwaukee, Wisconsin

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50-B STEAM BUCYRUS-ERIE
COMBINATION SHOVEL AND DRAGLINE

26' Boom
17' Dipper Handle
2 yard Dipper
50' Boom Dragline Equipment
1 KW 32 Volt Moon Electric Light Plant
Boiler—Standard coal burning locomotive type 54"x97"

1¾ cubic yard Page Bucket

INCLUDING

2 steel under-frame flat cars on which machine now loaded. New 1929. Shop No. 10557. Moved only 200,000 yards material. Excellent condition. Deal direct with owner.

PRICE VERY ATTRACTIVE

Box No. 465 LSD.

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ALSO
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1 18-TON VULCAN LOCOMOTIVE No. 887, 10x16 cyl., 36" gauge.

1 40-TON VULCAN LOCOMOTIVE No. 3295, 14.22 cylinders, link valve motion, standard gauge.

1 40-TON DAVENPORT LOCOMOTIVE No. 2189, new May 1931, 14x20 cylinders, link valve motion, standard gauge.

Box 100-L.

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WANTED

20 Good used, Sanford-Day, Drop-Bottom Mine Cars, 42" gage, 3 or 4 ton capacity. 559-ME.

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54 Steel bunks with mattresses and bedding. Mattresses and bedding are sewed up in burlap.
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50 Shovels and picks, approximate.
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4 Track jacks, 15 ton.
3 Track jacks, light.
1 Duplex Pump—Worthington, 8¼x3-½x5.
10 Slips.
1 Anvil.
1 Forge.
6 Switches.
4 Frogs.
10 Switch points.
2 Each, scythes, hand saws, cant hooks, spike mauls.
1 Carbide light.
1 Kitchen outfit.
10 Western dump cars, 5-yard.
1 36x84" vertical boiler.
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Will consider individual sale of separate items.

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1 Main Engine
1 Boom
1 Dipper Shaft
1 Crowding Engine
1 Five Yard Dipper

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Priced to Sell

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Works: Chicago, Ill.

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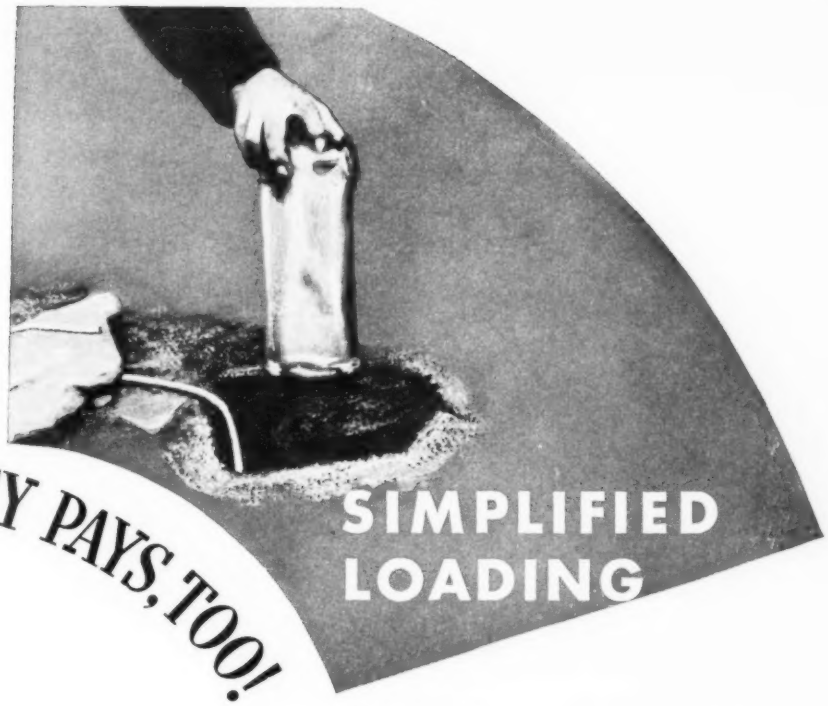

SIMPLICITY PAYS, TOO!

● Simplified loading is a large cost saver in big shots and a worth while one in little ones, too.

Here's all there is to it:—Pass one end of the Cordeau-Bickford detonating fuse through a cartridge and lower to the bottom of the hole. Load and tamp. Connect each hole with wrap connections to the main lines of Cordeau. Finally—when all connections are completed—cap the end of the main-line Cordeau with an E. B. Cap or Fuse Cap, and fire all holes at the same time.

Note that there is only one connection to be made at each hole no matter what its depth, or number of broken charges. Much time and labor are saved right here. And if giant blasts are used in place of numerous small blasts, one's equipment can stay in place until all drilling is completed, instead of being constantly shifted around.

These are worth while savings of which you should take advantage. Yet this is only one of the five ways in which Cordeau-Bickford will save you money. Write us and learn the other four. THE ENSIGN-BICKFORD COMPANY, *Simsbury, Conn.* Estab. 1836.

CORDEAU
DETONATING FUSE
BICKFORD
ALSO SAFETY FUSE *Since* 1836

THE ENSIGN-BICKFORD COMPANY

CB-12

For your convenience in writing to The Ensign-Bickford Company, you will find a card bound in this issue.

IF YOU have a "traveling man's" job for a ⅜-yard machine, this simple, pneumatic-tired 10-B Trailer will hustle your Bucyrus-Erie 10-B from one distant job to another at trucking speed. No hoists or other apparatus are required to load ... the 10-B crawls astride on its own power; the trailer-jack lifts the machine clear of the road; the drawbar is hooked to your truck, and you are ready to go ... one mile or a hundred.

fast moves

BUCYRUS-ERIE

EXCAVATING, DRILLING, AND MATERIAL-HANDLING EQUIPMENT...SOUTH MILWAUKEE, WISCONSIN

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